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THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

EDITOR:
BRIAN O. C. GARDINER, F.L.S.

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CONTRIBUTORS

CONTENTS

BOOK REVIEWS

BUTTERFLIES

REPORTS

ERRATA

Page 57, fourth line from bottom, the "Sigma" was accidently omitted and the line should read:

($x = 0.191$; $\epsilon = 0.177$) and edge coefficient

($x = 0.083$; $\epsilon = 0.081$)

Page 129, for **APHORISH** read **APHORISM**

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FEBRUARY 1983

THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

WORLD LIST ABBREVIATION:

BULL AMAT ENT SOC

EDITOR:

BRIAN O. C. GARDINER, F.L.S., F.R.E.S.

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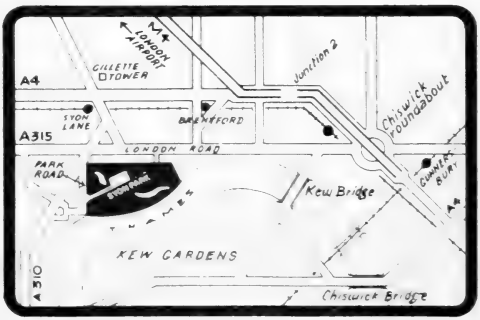

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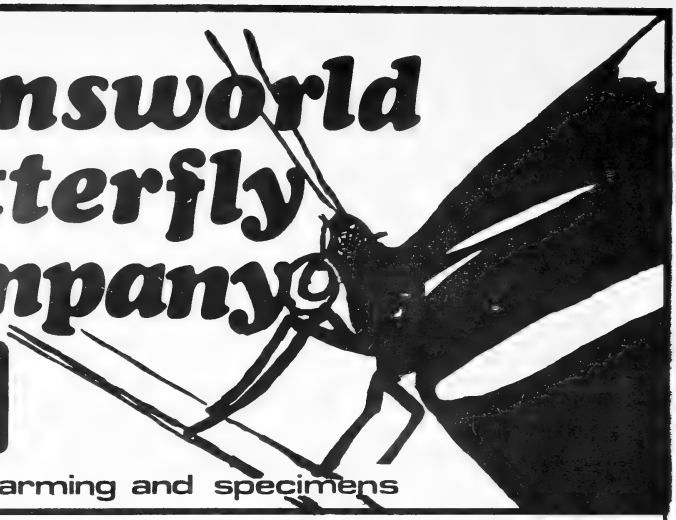

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AES
BULLETIN

No. 338

EDITORIAL

After many hours of consultation and discussion which extended over most of last year, the Council of the AES has agreed to a policy on insect collecting and conservation. This we publish in this issue.

In some respects the various laws which have been passed and come into effect over perhaps many decades are contradictory. For instance, one plant, the thistle broomrape, is protected under a recent act, but one of its hosts is the creeping thistle, a weed species notifiable under the Weeds Act of 1959, which obligates the landowner to destroy it. But in so doing he may be committing an offence by also destroying its parasite! Turning to the Lepidoptera we find that while any trade in Birdwing butterflies is in some quarters illegal or at least actively discouraged, the Government of Papua New Guinea is very actively encouraging the breeding for sale of these magnificent animals as part of its cottage industry and export policy. Indeed it has been found that the planting of foodplants and the consequent breeding of insects is more profitable than clear-felling and the planting of a monoculture of oil palms. From the conservation point of view this surely must be a more sensible attitude than a total ban on collection and sale which then results in total habitat destruction for mining or farming purposes.

In this issue we publish two articles which were originally prepared for inclusion in our *Dipterist's Handbook* but omitted on cost considerations. These are "Illustrating Insects" by the late Cyril Hammond, and "Illustrating Microscopic Detail" by Antony Irwin. As the content is relevant to the drawing of all insects it is now published for the assistance of all members in the hope that it will be of help to those who illustrate their own contributions to the Bulletin.

THE AMATEUR ENTOMOLOGISTS' SOCIETY.

POLICY ON INSECT COLLECTING AND CONSERVATION

1. The Council believes that insect collecting, responsibly and intelligently undertaken, is beneficial to our knowledge of the insect fauna and that it supplies data which can assist in better land management and usage in the interests of conservation.

2. The Council recognises the fact that concern about insect conservation is largely confined to entomologists, the majority of whom are collectors, and would emphasise that the hobby of collecting insects is the natural and pleasurable gateway through which most young entomologists pass. It thus considers that any unnecessary restriction of collecting would alienate those very people to whom we must look for the continuing interest in the study and conservation of our insect fauna.

3. The Council opposes collecting only in instances where it may be considered to threaten or endanger a population of insects. Species classified as endangered under the law of the country concerned may only be collected with a valid permit to do so.

4. Collectors must always exercise great care and restraint in collecting any species but especially in the case of rare, local, weak, depleted or environmentally stressed populations. They should evaluate the possible consequences of their actions before collecting.

5. Collectors must avoid damage to habitat during field work.

6. Collectors should be prepared to make available their collections for research purposes. The Council encourages members to co-operate with County Naturalist Trusts and similar bodies by supplying information and practical help in insect conservation, including breeding species for re-establishment or augmentation of insect colonies where such is supported by the appropriate organisation.

7. The Council neither supports nor opposes commercial trade in insects, but the conservation and welfare of any species must be the first consideration in acquiring living or dead material offered for sale. Members should not encourage the sale of endangered species and should always make proper enquiries into the source of any such material offered.

BRITISH RED DATA BOOK - INSECTS

Many countries have produced Red Data Books listing the fauna and flora under threat from environmental changes. In Britain the first of these for the Vascular Plants was published in 1977. Since then similar Red Data Books covering other groups have been in preparation.

The Insect Red Data Book is being prepared by a small committee sponsored by the JCCBI and chaired by Dr M G Morris. The editor is Mr P T Harding, to whom all correspondence should be addressed at the Institute of Terrestrial Ecology, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, Cambs PE17 2LS. All groups have been considered but only some Orders justified detailed treatment. These are the Lepidoptera, Orthoptera, Odonata, Trichoptera, Hymenoptera, Coleoptera and Diptera.

This Red Data Book will be invaluable in drawing the attention of entomologists, conservation bodies, landowners and planning authorities to the problems of insect conservation.

ANNUAL EXHIBITION, 1982

It was a welcome change, both for the Committee and the Members, to have the same venue for our Exhibition two years running. With ample space and first class facilities, especially parking and catering, the Civic Centre, Hounslow is probably the best location we have enjoyed and every effort is being made to book for 1983. Even after many years of successful Exhibitions, the numbers attending and their enthusiasm, was impressive. As a bonus, Saturday, 9th October was fine and dry and the pleasant autumn with an abundance of the colourful Red Admiral, Painted Lady and Tortoiseshell butterflies prompted many old friends as well as non-entomologists, to attend.

Exhibits were good and covered a wide range of interest although the Committee had hoped that more of our large membership would have shown their work and studies. Junior exhibits are of special value, appealing to the younger, or newcomers to entomology, and showing visitors the basic skills required. An outstanding project by Stephen Copestake, aged 11 years and details of which appear in the list following, received the Sir Eric Ansorge Award for the best Junior Member's project.

AES Specialist Groups attending were:-

AES Conservation Committee. The theme for 1982 was Urban Site Conservation linked to the need for members to channel their efforts through the local County Trusts and associated groups. To this end, part of the stand was devoted to the newly formed London Wildlife Trust which showed their work in helping to conserve the natural history aspects of Hounslow Heath. The Committee's new leaflet 'How to encourage butterflies to live in your garden' was available and sold out during the day. A live exhibit of aquatic insects from a suburban garden pond included several species of dragonfly larvae and a pair of *Dytiscus marginalis* L.

AES Insect behaviour and Ants Study Group displayed their past publications and an excellent selection of behavioural photographs.

AES Exotic Entomology Group included examples of foreign species bred this year and supplies of non-indigenous foodplants, required.

AES Publications offered all our current titles and showed plates for the new Silkmoth Rearer's Handbook.

AES Wants and Exchanges sold surplus material on behalf of members.

Also attending were the British Entomological and Natural History Society, British Butterfly Conservation Society and British Museum Publications.

It was a privilege to see the display of 'Birdwing Butterflies of the World' (Ornithoptera) from the largest private collection in Europe, Haugum and Low. All known species, approximately 40, were included as well as local forms. Many of these species are in danger of extinction due partly to over-collecting but mainly to the destruction of their habitats, the primary forests. Import into Britain is forbidden by the Washington Convention, except by special licence for scientific purposes and this ban includes 'farm' specimens bred specially for the trade.

Our sincere thanks are due to the Exhibition Organiser, Colin Hart, ably assisted by Peter Cribb, Sid Painter, Reg Fry, Eric Bradford, Rob Dyke and numerous members and friends of the Society: to the Managers and Staff of Hounslow Civic Centre for their pleasant co-operation and to the 23 Natural History dealers present, for their support.

Notes on exhibits were received from:-

Bloxham M.G. Diptera of the Sandwell Valley, West Bromwich, including specimens, descriptions and photographs.

Cassidy A.C. S/Ldr. A large exhibit of butterflies from Brunei, S. Borneo, collected during two visits to the rain forests in 1981 and 1982. The aim was to study the fauna of the Ulu Temburong district to determine its suitability as a National Park or Conservation Area.

Case 1 showed typical forest species of sub-families Theclinae and Curetinae (Lycaenidae). Case 2 identified species caught at carrion baited Blendon traps, mainly Charaxinae and Euthalini (Nymphalidae) Satyriinae and Amathusiinae (Satyridae). Case 3 included species of *Tanaecia* Butler (1869) and *Euthalia* Hubn. (1819), illustrating the problems of species determination caused by variability and polymorphism. Case 4 contained specimens requiring final determination.

Chalmers-Hunt J. M. (1683). A rare chocolate coloured aberration of the Common blue butterfly (*P. icarus* Rott.) and local microlepidoptera including *B. procurella* D & S, first found in Britain in 1976.

Colville Q. Aberrations of White butterflies (Pieridae) and the September Thorn moth (*D. erusaria* Schiff.)

Copestake J. (J.) A survey of the Dung beetles (Scarabaeidae) of Glamorgan with lists, specimens and photographs from various localities. **(Winner of Sir Eric Ansorge Junior Award.)** See next article.

Cribb P. W. (2270). A case of reared silkmoths (Saturniidae) to illustrate some of the species featured in the new edition of 'A Silkmoth Rearer's Handbook'. Type British hawkmoths, to be the subject of a new AES Handbook, projected for 1983 and a drawer of European butterflies bred this year from stock collected abroad. These included *A. apollinus* Herb. (False Apollo) from Asia Minor and *Z. cerysii* (Festoon sp.) from Crete. Also a male *N. polychloros* L. (Large Tortoiseshell) with a homeotic hindwing pattern.

Field J. P. (5626) The aculeate bees and wasps, mainly solitary, of Rewell Wood, Sussex. Some half of the 140 species already recorded were exhibited with examples of prey, photographs and biological notes. More local records would be welcomed.

Fox T. Photographs of the surprisingly large number of butterflies noted during a tour of historic ruins in Tropical Mexico, September/October, 1980.

Gossling N. F. (5169). A representative collection of the commoner butterflies flying in the Roossilon and Languedoc regions (S. France) from June to August. Also maps and photographs.

Greatorex-Davies N. Study of the colonisation of Southern beech (*Nothofagus*), a fast-growing hardwood from S. America by phytophagus insects. The larvae of two Winter moths, Dotted Border (*E. marginaria* Fabr.) and Scarce Umber (*E. aurantiaria* Hubn.) are principal defoliators and, for research, live material of these species from other areas is required by the Institute of Terrestrial Ecology at Monks Wood Experimental Station, Abbots Ripton, Cambridge.

Harman T. W. (5925). Examples of the larger moths from Brunei, S. Borneo, (Saturniidae and Sphingidae sp.) also migrant and varieties of British lepidoptera, recorded in 1982.

Hilliard R. D. (99). Type specimens of 29 species of moths whose larvae have been found in recent years on Black Poplars (*P. nigra*) in the parks and open spaces of N. W. London. Some of these occur in much larger concentrations than in more rural areas.

Jewess P. J. (5428). An extreme aberration of the Small tortoiseshell butterfly (*A. urticae* L.) taken in the field.

Johnston M. (3464). Typical species of coleoptera with descriptions and map for an island in Central America, St. Lucia.

McCormack R. F. (3375) and Penney C. C. (3880). Selection of moths recorded at a light trap in the Ben Nevis district of the Scottish

Highlands, June/July, 1982. Of special interest were the Great Brocade (*E. occulta* L.) and among the four Plusiinae, the Scarce Silver Y (*P. interrogationis* L.).

Patel S. J. (751). A collection of Red Underwing moths (*Catocala*) made in the USA by J. R. Kaufman in 1964 - 1966.

Patel S. J. (751) and Patel D. J. (6950). Dwarfism in 2nd. brood of the Small tortoiseshell butterfly (*A. urticae* L.) from Durdle Door, Dorset.

Pickles A. J. and Mrs. C. T. (5225). Races of the Silver-studdied blue (*P. argus* L.) including the extinct s.sp. *masseyi* Tutt from the Westmoreland mosses. Seven species of migrant moth recorded this year from Lymington, Hants. and Portland, Dorset, notably the Four-spotted Footman (*L. quadra* L.) and *P.unionalis* Hubn. (Pyralidae).

Pratt C. R. (5965). Immigrant moths noted at Peacehaven, Sussex during 1982 including three hawkmoths, Convolvulus (*H. convolvuli* L.), Striped (*C. livornica* Esp.), Humming bird (*M. stellatarum* L.) and the Vestal (*R. sacraria* L.).

Reavey D. (6934 J.) and Reavey S. (Member of St. Mary's College N.H.S.). A comprehensive project investigating two dung lovers, the Purple Emperor butterfly (*A. iris* L.) and the predatory Yellow dung fly (*S. stercoraria* L.). The display included photographs, set specimens and livestock with an explanation of the two parallel studies.

Revels R. C. (3942). Large photographs showing the life histories of some British butterflies and dragonflies. All were in cibrachrome colour prints, enlarged from colour slides.

St. Ivo School N.H.S. Many of our members and friends regard St. Ivo's annual visit as a high-light of our Exhibition. Mr. Berman, aided by a host of capable scholars, contrives to transport and display effectively living creatures of diverse Orders.

Simpson M. (4859). Type collection of butterflies, recorded from the Huntingdon district of Cambridgeshire.

Skinner B. (2470). Series of The Feathered beauty moth (*P. secundaria* D & S.) from Ham Street, Kent. The species was first recorded in Britain in 1981 and these represent the first bred specimens. Some local and aberrant moths including the Sub-angle wave (*S. nigro-punctata* Hufn.) from Ham Street, the Grey (*H. caesia mananii* Gregs.) from Isle of Skye and a unique race of the Cloaked minor (*M. furuncula* D & S.) from Ross Sands, Northumberland. Among the migrant species was the Scarce black arches (*N. aerugula* Hubn.) from Ham Street.

Skinner B. (2470) & Elliot B. Bred series of the Shaded fan-foot (*H. tarsicrinalis* Knoch) from E. Suffolk. This was only the second British record and the first specimens bred in this Country.

Sokoloff P. A. (4456). A cocoon mass of the Bee moth (*A. sociella* L.), normally associated with bee or wasp nests. This mass was found under a roof feeding on detritus, including a polystyrene tile. Over 100 moths emerged and a short series was exhibited.

Vick G. S. (4942). Species of European dragonflies of the genera *Sympetrum and Leucorrhinia* (Odonata Libellulidae) from various localities. Special note was made of species breeding regularly in Britain and two occasional migrants, *S. flaveolum* L. and *S. fonscolombei* Selys.

Williams P. H. (4965). Examples of the 16 species of *Bombus* recorded in Britain over the last 70 years. An appeal to help the Cambridge Bumblebees Survey. A detailed (2km) grid of Cambridgeshire Bumblebees was projected with date classes to show the changes in the fauna since 1900.

R. D. Hilliard (99)

ANSORGE AWARD EXHIBIT 1982

My exhibit for the Ansorge Award was one on dung beetles of Glamorgan. I studied six different habitats, Candleston, Ogmore Down, Ogmore Castle, Llantrisant Common, Gilfach Goch and the Bwlch mountain. The habitats range from Candleston which is just above sea level to the Bwlch mountain which is about 1800 feet above sea level.

Candleston has quite a lot of sand dunes, some up to 200 feet high. The dunes are the homes of many rabbits, but the dung which I looked at was that from horses which people rode along a dry river bed. I did not find any beetles on rabbit dung. Candleston has 30-40 inches of rain a year.

Ogmore Down is hill rising to 300 feet and overlooks Candleston. Most of it is a golf course and sheep graze on the whole part including the golf course. Ogmore Down has a few trees down the side of the hill facing Candleston; it has about the same rainfall.

Ogmore Castle is just above sea level, and is across the river from Candleston, and is at the foot of Ogmore Down. You can cross the river by stepping stones but whenever there is heavy rain upstream the stepping stones are submerged. Cows and horses graze across the river. It too has 30-40 inches of rain a year.

Llantrisant Common is 230-400 feet above sea level and is fairly flat with a stream running by it, some parts being marshy. It has had cattle and horses grazing on it for many years. Rainfall is 40-60 inches a year.

Gilfach Goch is a narrow valley with the bottom 600 feet and the tops of the mountains about 1300 feet above sea level. It is the place where we

live and is also the valley of the film and book, "How Green Was My Valley". The rainfall is 80-100 inches a year.

The Bwlch mountain is about 1700-1800 feet high and is the highest mountain range in Glamorgan, it also has the highest rainfall of all over 100 inches per year. This mountain is often in the clouds.

I found many different dung beetles but only seven species on the Bwlch mountain. However in the lower and drier habitats there were a lot more different species. I found more dung beetles in Gilfach Goch, but that may have been because I had more opportunity to search there.

Glamorgan is a very good county for beetles with a wide variety of habitats and there are few entomologists. I have found many interesting beetles while preparing this exhibit. At Candleston on the coast I found *Eurynebria complanata,* there were dozens of them under rusty oil drums! In the sand dunes among coarse grass my father and I found sand tigers, species *Cicindella maritima.* I found a very rare yellow and black longhorn, *Leptura aurulenta* in an old log half buried in the sand, and in the same log I found *Sinodendron cylindricum.* In some other old logs we found a lot of lesser stag beetles, *Dorcus parallelopipedus.*

In Gilfach Goch we found a lot of carrion beetles under dead sheep. My father was excited to find the rare *Trox sabulosus.*

I have enjoyed preparing this exhibit very much and I was very pleased when I won the Ansorge Award. I am putting the money towards a stereoscopic microscope.

Stephen Copestake (age 11 7344J).

LEAF-MINING LEPIDOPTERA IN MIDDLESEX

The Civic Centre in Lampton Road, Hounslow is an admirable site for the Society's Annual Exhibition. Members may not realise that Lampton Park itself is also an excellent locality for the lepidopterist. As a break from the hurly-burly of the trade fair, I took a walk in the sunshine outside. Many of the trees in the park are introduced species which are relatively unattractive to our native Lepidoptera, but nevertheless I managed to record 42 leaf-miners. These included *Stigmella minusculella* (Herrich-Schäffer) on pear; this is new to Middlesex and is only the third British record in the last 50 years. Another nepticulid which I noted was *Etainia sericopeza* (Zeller), which feeds in the keys of Norway maple. It has been recorded from only five counties and less than ten localities, all since 1975; earlier records were misidentifications of *E.sphendamni* (Hering) which feeds on field maple. The mines of *Phyllonorycter emberizaepenella* (Bouché) were abundant on snowberry, the more usual foodplant being honeysuckle. This may be a new county record, as may *P.mespilella* (Hübner) on pear and *Coleophora peribenanderi* (Toll) on

creeping thistle. *Recurvaria nanella* (Denis and Schiffermüller) was found on apple and also on cherry, the latter apparently being hitherto unrecorded foodplant in Britain. These were the highlights amongst the records made during a very pleasant afternoon stroll.

A. M. Emmet (1379)

ILLUSTRATING INSECTS

It is imperative that if an illustration is to be of any use the artist must have an accurate and comprehensive knowledge of the subject to be illustrated. This is especially applicable where the position of a bristle or the bend or angle of a wing vein may be a specific character.

First consideration must be the scale and a drawing should be from 3-6 times the size it is to appear in print. This allows for sharpness in reduction and helps to smooth out any unevenness caused by slight handshake.

The cheapest form of illustration and the most widely used is the line-drawing. For this type of work the material most generally used is bristol-board which has an extremely smooth surface, and the medium used is indian-ink or other specially prepared drawing ink. Various widths of drawing pens are available and the fine "Rotring" type pen or a mapping pen is useful for fine detail. The drawing will, of course, be outlined in pencil so that alterations may be made before inking in. Shading can be done in two ways: by 'cross hatching' where shade variation is attained by the distance between lines, or by dots small or large and wide apart or close according to the density needed.

A more expensive type to reproduce is the pencil drawing where the shading will resemble a photograph. Reproduction of this is known as 'half tone' and the black and white illustrations in 'Flies of the British Isles' were done in this way.

Reproduction is by photographing through a screen to reduce the picture into dots for printing. The closer the mesh of the screen, the sharper the result. Several grades of pencil will be needed ranging from HB to 6B.

Although colour illustrations have most appeal it is useless to embark on these (except for personal satisfaction) as the cost of reproduction is prohibitive unless there is to be a wide circulation to reduce the cost. The author used the best quality white cartridge paper for 'Flies of the British Isles' as this material absorbs colour more readily than smooth surface material and subsequent alterations, if needed, can be more readily made. Considerable enlargement is necessary to ensure sharpness in reproduction. The illustrations in 'Flies of the British Isles' varied from 15″ to 20″ across allowing the veins to be painted more evenly with larger brushes, and consequently more control, but hairs could be done more

satisfactorily with a No. 00 brush. Bearing in mind that colour-printing means at least four separate blocks superimposed, the illustrations should be little brighter than the insect to be illustrated, as the artist will learn from experience. Artists' water colours are most commonly used but various alternative media are now on the market and can be used singularly or in combination.

Whatever the method of illustration a microscope is essential. A Greenough binocular-type is most suitable as this gives an upright stereoscopic image so helpful in locating the position of bristles correctly and with less eye-strain with continued use. A squared eye-piece is recommended as this helps in both scale and positioning.

With large species only a portion of the wing is visible through the lowest power objective and a wide angle eyepiece and the squared eye-piece is here a help in correct alignment.

Cyril O. Hammond

ILLUSTRATING MICROSCOPIC DETAIL

Good microscopic illustration is not easy. Bearing this in mind, one should always consider whether or not an illustration is justified. Journals will not accept drawings or photographs which do not add to or enhance the text. To illustrate microscopic detail, either drawings or photographs may be used, but the aim is the same in both cases - to produce an enlarged, permanent image which can be reproduced on paper.

Photographs

Any microscope with a camera attachment can be used to photograph insects or parts of them. A single-lens reflex camera with through-the-lens metering is ideal for ease of focusing and assessment of exposure time. If colour photographs are required, use a flash or obtain some tungsten-light corrected film. Remember that a microscope photograph may have limited depth of field and may also incorporate specks of dirt on the specimen. Although reasonably quick, it is very expensive. For those having access to one, a scanning electron microscope will produce excellent photographs and is widely used by workers studying very small Hymenoptera. Before taking photographs, check that a journal is prepared to publish them!

Drawing — General Notes

A well-maintained drawing pen (e.g. Rotring) which uses permanent black ink is indispensible. Different nib sizes can be obtained for different types of drawing and different reduction ratios. The reduction ratio refers to the request from publishers that drawings should be at least twice the size (linear) of final reproduction. Thus a very fine nib (0.1

mm) is unsuitable, as the width of line is too small to be reduced satisfactorily. The most useful sizes are 0.2 mm and 0.4 mm. Preliminary drawings can be made using pencil on paper but the final drawings should be in ink on good quality tracing paper or white card.

Technique 1 — Projected Slides. Simply photograph the specimen using reversible film, monochrome or colour, and project the transparency up to the required magnification on a piece of paper. Though relatively simple and accurate, the method is expensive. Because of the limited depth of field, the detail on such drawings is best added by eye after the outline has been drawn.

Technique 2 — Microprojector. The use of a microprojector will eliminate the photographic stage of the previous technique. The image can be projected directly onto paper or onto the back of tracing paper. Problems with depth of field may be experienced.

Technique 3 — Camera Lucida. The camera lucida is a prism and mirror attachment which fits between the eyepiece and the observer, so that two images, one of the specimen, the other of a pencil tip on paper, are visible at the same time. The amount of light on the specimen and on the paper needs to be controlled to produce clear images.

Technique 4 — Drawing Tube. Some microscope systems (notably 'Wild') produce a drawing tube attachment which fits between the objective and the eyepiece. The disadvantages of it are limited magnification and vast expense.

Technique 5 — Squared Graticule. This comparatively cheap and easy technique consists of viewing the specimen through a squared graticule (which is inserted in the eyepiece) and transferring the image into squared paper. The drawing is then traced onto plain paper and fine detail added by eye.

Technique 6 — Freehand. The cheapest technique is unfortunately very difficult for most entomologists. Several attempts are often needed to draw accurately the basic outlines, but detail can be added more easily. One word of warning is necessary — if you are looking at the paper without moving your head from the microscope, it is all too easy to forget about perspective and end up with a lop-sided drawing! This problem can be overcome by putting the paper on a surface which is inclined towards the microscope. Short-sighted entomologists may have problems with techniques 3 to 6. (Life can be cruel!)

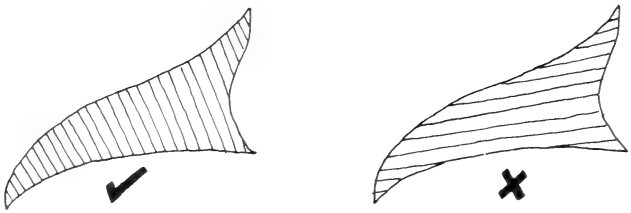

Fig. 1

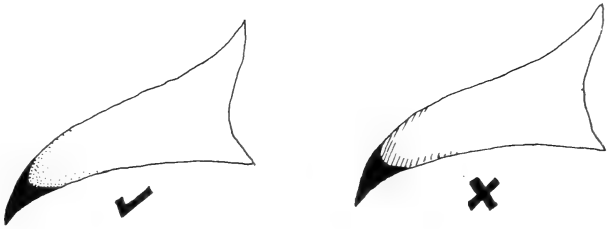

Fig. 2

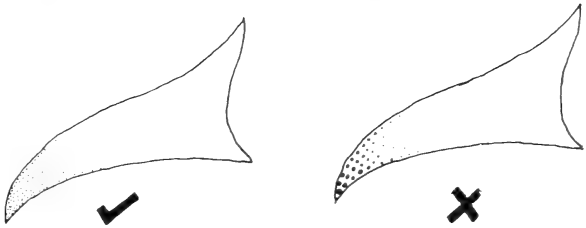

Fig. 3

Fig. 4

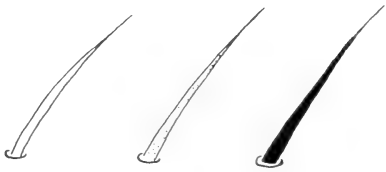

Fig. 5

Use of Shading and Stippling

Wherever possible the drawing should be simply a series of lines. Never include large black areas. The exceptions are black bristles and small, heavily-sclerotised areas such as the mouth-hooks of larvae. If extensive areas of uniform density need to be defined, use equally spaced parallel lines which are at right angles to the long axis of the area (Fig. 1). If an object contains areas of different density, show this by stippling (Fig. 2). Use a constant (small) dot size for stippling. Increase in the density of the object should be represented by an increase in the number of dots, and not by an increase in the size of dots (Fig. 3). The increase in dot size should only be used to represent individual pores of increasing diameter.

Anatomical Detail

Bristles. Almost all bristles on flies arise from sensory pits. If the pit or pore is visible, it should be drawn (Fig. 4). If the bristle is large, its comparative colour can be shown (Fig. 5).

Head. Do not fill in eyes with individual facets or cross-hatching. If the head is drawn in profile, include only the bristles of one side and the median bristles.

Wings and Legs. If plenty of specimens are available, try detaching a wing and sandwiching it in a glass transparency mount. It can then be projected onto a piece of paper for drawing. Remember that all veins have thickness, whereas shadows and folds do not. When illustrating a leg or bit of one, always indicate which leg it is and from which side it is viewed.

Genitalia. Often the whole of the genitalia need not be illustrated, but if a series of one part (e.g. surstylus) is being drawn, it is helpful to include one complete drawing so that the relationship to the rest of the genitalia is clear. If the genitalia are symmetrical, the bristles need only be drawn on one side. If the shape of a median process is important, draw at least three-fifths of the genitalia, rather than one half.

Drawing Standards

Illustrations for papers containing original descriptions of species should be regarded as part of the description, and should therefore be extremely accurate. If a type specimen is being illustrated, this should be made clear. If keys are being produced, sketch drawings can be used to illustrate the key characters only. Use pointers if the feature is not readily identifiable. Remember that good drawings will make a good paper, but bad drawings will ruin a good paper.

Labelling

Labels are vital for the interpretation of drawings and photographs. Two items are essential components of the label. These are the species name and the part drawn. Also useful (and sometimes obligatory) are the aspect and scale of the picture. Scale is most easily represented by drawing a line of stated length (e.g. 0.1mm) on the drawing. Labelling may make use of "Letraset" and similar aids to good lettering.

Final Hints

Always study the subject carefully, so that you understand how it is put together and can visualise it easily in three dimensions. Study other people's drawings. Learn to recognise the faults in bad drawings and try to emulate the good. Criticise everything and get others to criticise your work. If no one offers to improve it, then publish.

Remember — "a picture can paint a thousand words" — drawings deserve a lot of time and care!

Antony G. Irwin

SOME NOTES ON THE REARING OF TRICHOPTERA

During an ecological study of a Kent stream, I have been particularly interested in the rearing and breeding of caddis under laboratory conditions, as well as methods of transporting live caddis larvae.

To date, two species that have shown the most successful results in terms of rearing are *Agapetus fuscipes* and *Limnephilus lunatus*.

(i) *Agapetus fuscipes*

The larvae of this species live on the surface of stones and gravel, in regions of moderate or fast flow (Hickin, 1967). They are best transported on the stones on which they are found. If a half-gallon 'bait-box' with a watertight lid is used for this purpose and filled to the brim with water, most survive a journey of at least 4-5 hours. Survival is much improved if an airline from a battery operated air pump is introduced via a hole in the lid. As soon as is practicable, the stones with the attached larvae are transferred to an aquarium (18 × 12 × 12 inches) filled with filtered river water and aerated with a standard airstone. In all the tanks used to rear this species the bottom was covered with gravel to a depth of 5 cms. For the purpose of successful rearing alone (i.e. rather than a detailed study of the individual instars), the instars are not separated. Any larvae that are found to have fallen from the stones during transit are best kept separate, and placed in a small volume (about 200 ml) of water, which is kept aerated. Those that survive overnight can be added to those already placed in the aquarium.

The temperature of the water should be monitored, and preferably kept in the range of 10 - 12°C. Experiments show, however, that *A. fuscipes* can be reared successfully over a wider range of temperatures (10

- 18°C). One of the most important factors for the survival of this species is a careful monitoring of the food supply. The larvae feed on encrusting algae, as well as detritus which they scrape off the surface of stones using the specially modified mandibles. The only way to ensure that a balanced range of suitable food species is present is to regularly collect 'fresh' stones from the habitat where the larvae are found. For those unable to collect stones regularly this could present difficulties. However, experiments have shown that the larvae may survive without any input of 'fresh' stones to about the 4th instar, but most die after this, probably for lack of suitable diet.

For breeding, the following has proved to provide optimal conditions. As the adults emerge, they are collected in small glass sample tubes, and then sexed. Three males and five females are then transferred to a glass receptacle e.g., jam jar, which is half-filled with filtered river water. The bottom is covered with a mixed substrate (see later), and a piece of plastic mesh ("Netlon") is placed in the container. At this stage, no airstone is provided (in the initial experiments, one was included in 50% of the jars, but there was no observable difference in the behaviour of the females). A piece of muslin is used to cover the jars, held in position by an elastic band. A hole is then cut in the middle of this, and plugged with cotton wool. This allows the easy introduction of the adults, from the sample tube. *A.fuscipes* mates readily under these conditions, egg-laying occurring soon afterwards (within an hour). For egg-laying, and the subsequent successful hatching, the composition of the substrate provided in these 'breeding jars' is of vital importance. Experiments show that the best way to ensure that oviposition is completed is to provide a mixed substrate, i.e. one that contains fine and coarse sand, as well as fine and coarse gravel, (max. 5-6 mm diam.). The female lays eggs between two pieces of gravel utilising a 'capstone' as mentioned by Anderson (1974). In addition, this substrate provides a suitable environment for the newly hatched larvae, which, unlike the ovipositing females, required very fine substrate (to construct their first case). The larvae hatch after 20-29 days, depending on water temperature (10-12°C). The "Netlon" is used by the females to gain entry to the water. Where this was provided, very few females used a different way to enter the water. Whether successful oviposition has occurred can usually be ascertained by looking for the familiar 'sandwiches' of gravel, between which *A.fuscipes* lays its eggs. Although it has been shown that aeration is not essential for hatching to occur, it is advisable to provide an airstone at this stage as it reduces colonisation by undesirable algae. In the small jam jars, the larvae can be observed easily, and can be kept in these until they are easily visible, and then transferred to an aquarium, and the life-cycle followed through. Like all caddis the length of time between instars is long, totalling six to seven months. Thus an efficient filtering system should be sought, to reduce cleaning of the aquarium.

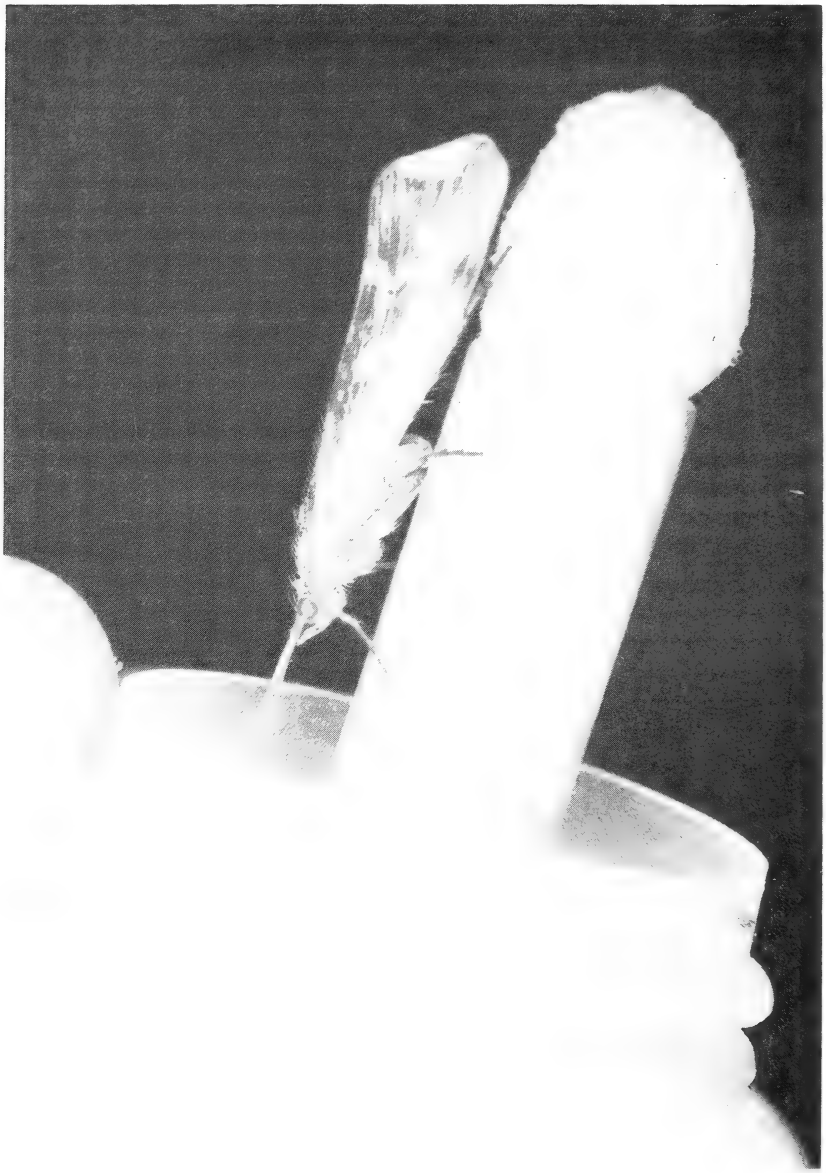

Fig. 1. Trichopteron at rest on side of tube containing sucrose solution.

(ii) *Limnephilus lunatus*
This species, larger than *A.fuscipes* is also relatively easy to rear. Transportation is basically as above, but ideally larvae should be surrounded by a dense mass of plant such as *Rorippa nasturtium-aquaticum* (watercress) which is a food plant for this species. The 'bait-box' should contain a smaller volume of water (5-6 cms in depth).

The larvae should be transferred to an aquarium as soon as possible (see above). Feeding is relatively straightforward for this species. For those who live close to a stream or river, regular collections of watercress can be made. Otherwise, shop-bought watercress is readily acceptable! The only disadvantage with the latter is that the thicker parts of the stems, and the roots, are usually removed, and it is these parts that are used in case-building. The water level in the aquarium should be kept shallow (approximately 15 cms), so that the larvae can reach the food plant, which, if it is not anchored in the substrate, tends to float to the surface (although stones can be used to hold the plant in place). "Netlon" is very useful in providing the larvae with a rot-resistant framework on which to move, and food material can be attached to it. The final stage instars will attach themselves to this prior to pupation. After the emergence of the adults the latter are left in the main aquarium rather than being transferred to smaller units. However, if necessary the adults can be placed in 3 × 1 inch glass sample tubes containing a supply of sucrose solution (Fig.1).

Because they are considerably larger than *A.fuscipes*, they are easy to observe. The females do not tend to lay below the water's surface; the egg-masses being deposited on those parts of the "Netlon" (or food plant) above the surface of the water. To ensure that these do not become too dry, an airstone can be placed just under the surface of the water, in the vicinity of the egg-mass — this gives a fine spray of water. On hatching, the larvae immediately make their way down to the water. Experiments have shown that although the eggs occur naturally out of water, they will also develop if submerged.

A note on providing the correct substrate for caddis
When caddis are being kept in aquaria for considerable lengths of time, the composition of the substrate is of vital importance. In the case of *A.fuscipes,* the wrong substrate type will prevent successful oviposition, as well as the successful development of the newly hatched larvae. It is always a good idea to take a sample of the substrate on which the larvae were found in their natural habitat. This can be washed, and oven-dried and later referred to, or if sufficient amounts have been collected, it can be used in setting up the aquaria etc. This should ensure that the adults and larvae have access to the type of substrate they would normally be encountering. However, for species other than the above two species, other conditions may apply e.g. for those that use vegetation for case-

building, the correct plant species for case-building as well as for feeding must be provided. A careful study of the environmental requirements is a pre-requisite to setting up any laboratory breeding programme.

I would like to thank Dr. T. J. Mortimer, Dept. of Zoology, Chelsea College, for reading the manuscript.

Sue Eldin, M.Sc. F.R.E.S.

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BOOK REVIEWS

The Biology of the Coleoptera by Dr. R. A. Crowson. 802 pp., Academic Press Inc. (London) Ltd., 1981. Price £58.00 (ISBN: 0 12 196050 1).

Whenever Dr. Crowson puts pen to paper the entomological world is guaranteed something worthwile to read, his researches have stood the tests of time and later research, and his first book *"The Natural Classification of the Families of Coleoptera"* (1955) which first appeared in instalments in the *Entomologist's Monthly Magazine* has been in constant demand, being reprinted in 1967. The present work is an attempt to gather all the known biological information about beetles and present it in a readable form. To get all this in one book necessitates summarising published work and researches and we are indeed fortunate that Dr. Crowson might be classed among those "eccentrics who would wish to devote their entire lives to the study of beetles" (p.689). Unfortunately this description coined by Crowson seems to have stuck even though his interests are not confined to the Coleoptera. The end result is admirable and the book will remain an essential reference and necessary reading for many years, not only for Coleopterists, but for the general entomologist, zoologist, physiologist and ecologist.

The 802 pages of text are preceded by eleven introductory pages, a Foreword by Prof. Ghilarov and Preface by the author. The main text starts with an Introduction: The Study of Beetles, in which the historical study is briefly summarised with notes on the study, problems of classification, and the preparation and preservation of adult and immature beetles. Chapter two covers Some Skeletal Peculiarities of the Adults, the next chapter deals with Internal Structures of the Adults, then, Some Structural Features of Larvae and Pupae. Chapter five discusses Food, Digestion and the Alimentary Canal; six, the Blood, Osmoregulation, Reserves, Excretion and Endocrine Organs; seven, Locomotion, Respiration and Energetics; eight, The Senses; nine, Cuticular Properties, Appearance, Colour and Luminosity; ten, Adult

and Larval Behaviour; eleven, Development and Life-cycles, and twelve, Cytology and Genetics.

The next chapters deal with beetles and their environment; chapter thirteen, Water Beetles; fourteen, Special Habitats; followed by Predation and Defence; Symbiotic and Parasitic Relations; An Ecological Triangle: Beetles, Fungi and Trees; Herbivorous Beetles; Geographical Distribution and Conservation: Beetles as Ecological Indicators, and chapter twenty, Evolutionary History of Beetles. The final chapter entitled "Epilogue," gives us much food for thought as to the future study of beetles in a time when natural habitats are vanishing at an alarming rate. An extensive Bibliography follows, then Taxonomic and separate Subject Indices finish the work (Oh! that our own "*Dipterist's Handbook*" had even one index!).

Although full of highly specialised information, the book is not aimed for the specialist. A unique system of listing the Superfamilies (by letter) and families (by number) is adopted, and each family or genus is suffixed by this code, a full list of superfamilies and families comes near the end of the book. Thus anyone can at once place an unfamiliar genus or family - for example the Boganiidae belong to the Cucujoidea, superfamily 'T' and are family number '3', thus, when mentioned in the text, (T3) is added, after a little use one soon becomes familiar with the system. The book is well illustrated with 319 figures and nine composite plates (a total of 45 individual photographs) and fifteen tables. The figures and plates, when quoted in the text have their page number added too, making for easy reference. The standard of printing and quality of paper are very good and the book is well bound in hard covers.

The price might put a lot of people off, but it seems almost a fact of life today that good books are expensive, and alas, so are many indifferent books. The "*Biology of the Coleoptera*" is an excellent book, and the amount of information it contains plus the high standard of production make the book good value and I strongly urge all Coleopterists to seriously consider buying their own copy; it is an invaluable work and we owe Dr. Crowson a great debt for producing this definitive work.

J. Cooter

Butterflies of Essex - provisional maps. by R. G. Payne and J. F. Skinner. A4. 26 pp 54 maps 1 illust. (1982). Obtainable from Southend Central Museum Victoria Avenue. Price £1.10 post free.

This small publication is the result of a survey from 1970 to 1981 of the butterflies of Essex, providing additional detail and maps to the coverage in Firman's 'Guide to the butterflies and moths of Essex' published in 1975. After a brief introduction the status, foodplants and flight times of 29 species are detailed, each accompanied by a small map showing the

10 km distribution of the species. There is a small section on immigrants and possible residents, concluding with 25 maps showing the distribution of selected species on a 1 km-square dot map.

It would have been helpful to detail the source of some of the more interesting records, as occasional dots appear in areas where there are no suitable habitats for the butterfly. However such publications as this are very useful as they serve to encourage others to record their observations and thus contribute to our knowledge of butterfly distribution.

Paul Sokoloff

Benjamin Wilkes: The British Aurelian. Twelve New Designs of English Butterflies and Directions for making a Collection. (1742 et seq). With an essay by R. S. Wilkinson. 1982. Facsimile edition limited to 475 numbered copies. Published by E. W. Classey Ltd, 1982 as Classica Entomologica No. 3. 12 pages of text material plus Frontispiece, Directions and 12 Design plates. Size 12½″ × 12″ in card folder. Price £20.

This work was inspired by the purchase by Eric Classey of four odd plates of the rare Carington Bowles edition of Wilkes's 'Twelve New Designs'. Detective work by Miss Pamela Gilbert, Librarian of the B. M. (Nat. Hist.) Dept. of Entomology, resulted in a compilation which includes all the twelve designs, including the four mentioned earlier and the only known copy of his 'Directions for making a collection'.

Benjamin Wilkes described himself, when seeking to join the Aurelian Society as 'A Painter in Oyls'. Dr. Ronald Wilkinson in his introduction to Wilkes gives us a brief chronology of the founding fathers of scientific entomology from John Ray to James Petiver. The linking influence between the founders and the clap-net collectors, Wilkes and Moses Harris, being Wilkes's admirable friend Joseph Dandridge. It was Dandridge who was the prime mover of the Aurelian Society. An interesting bibliography is included in the introduction.

Wilkes recorded many sites of his finds such as 'The Glory of Kent' from Western (Westerham) and *C.fraxini* from 'near Cleifden in Buckinghamshire'. His comprehensive broadsheet on collecting gives techniques of the day, which includes an excruciating method for killing moths by inserting an Aqua Fortis tipped needle from stern to stem! The designs or plates were originally published for one Guinea plain or 2½ Guineas coloured. The facsimile plates are uncoloured and no doubt some enterprising people will wish to colour their copy. The twelve designs give variations in geometric symmetrical patterns using identified lepidoptera. The artistry reflects an attitude which was eclipsed a century

or so later in favour of a systematic attitude to layouts. Some of the captions give the locality or vernacular name of the odd specimen.

Undoubtedly this is a work for the serious collector who has an interest in early entomologists and their 'art'.

S. A. A. Painter

The Rewell Wood - A West Sussex Wildlife Recording Group Report, pp 125, A5 Spiral Bound. Published by (and obtainable from) M. Edwards, Lea-side, Carron Lane, Midhurst, Sussex. Price £1.50 (by post £1.90).

This spiral bound booklet is a pleasant and slightly informal survey of The Rewell Wood near Arundel in Sussex. The style is interesting and together with some line drawings this improves the readability of the list. The format is double spaced and typed which is very wasteful of space, an average page has twenty-one lines, less than half of this 'Bulletin' for the same page size. The list covers most plant and animal groups but in 125 pages of approximately A5 size it cannot be considered complete. 'Microlepidoptera' are not covered, presumably because no recorder was available.

Most species are simply named as being present and in a small survey covering just two one-kilometre squares this may well be adequate, personally I would have liked to see observation dates included. Some species are given the briefest of comments, for example "*Cichorium intybus*-by A27" whilst others are more generously treated with sixteen lines for *Lampropteryx suffumata,* Water Carpet.

The real function of this publication would appear to be to call attention to the fact that the wood contains some good species, particularly of Aculeate Hymenoptera, in a very small area. It is also pointed out that the habitat is vulnerable to what are called "certain recreational pursuits". I wonder if this means courting couples, scrambles motorbikes or just plain picnicing. In highlighting the entomological interest I think the book is successful (Invertebrate Site Register recorder please note) and I was left with a strong inclination to go and see this place for myself.

Colin Hart

The Buprestidae of Fennoscandia and Denmark, by S. Bily, 1982. (Volume 10 in the Fauna Entomological Scandinavica Series). 110pp., 108 figs., 2 colour plates. Cloth bound (ISBN 87-87491-42-7). Ordinary price* D.Kr.100.

This is the first volume in this excellent series to deal with the Coleoptera, For the British Entomologist, the series title might be off-putting. However, it is policy to publish each volume in English and to include the British and Northern European species, even if they do not occur in Fennoscandinavia.

For the general Coleopterist this work might appear less attractive than it should owing to the publication in 1977 of the Royal Entomological Society Handbook, Vol. 5(1) "Buprestidae". However, the Fauna Entomologica volume goes into greater detail than the 'Handbook'; another point that will doubtless influence the British Coleopterist is that our few buprestids are reasonably distinct enough to be determined in the field. It should be borne in mind that the work under review is not just an aid to the determination of the species. There are chapters on adult and larval morphology; Bionomics and Ecology and a brief section on their Economic Importance and Collecting and Preserving. There are keys to the adults and a provisional key for the larvae. Each genus begins with synonymy and generic characters with brief notes on distribution, following this come keys to the adults and larvae. The bulk of the text is taken up with more detailed information in a way similar to "Fowler".

It is a pity that *Agrilus sinuatus* (01.) has been omitted from the work, and one name change affects our fauna - viz the reversion to *Agrilus biguttatus* (Fabricius, 1777) and the sinking of *pannonicus* (Piller & Mitterpacher, 1793) as a synonym. In the catalogue (pages 100 - 105) there are some errors, five non-British species marked as British, and *Aphanisticus emarginatus* (01.), a British species, not marked as native. However, these minor points are not present in the main text so one might assume them to be printer's errors.

It is good to see *Phaenops cyanea* marked as occurring in Britain in the catalogue, and given as "not native in Great Britain" in the text; it having a very slender claim to British status - long extinct.

I was most interested to read (page 44) that the adults of *Melanophila acuminata* (Dg.) are attracted to their breeding areas by infra-red radiation, and not by the smell eminating from the burning pine. Perhaps we should try sun-tan lamp trapping rather than the useless turpentine or pine oil 'bait'.

The quality of production, printing, paper and binding are good. The two colour plates depicting seventeen species are clear and the colours well produced - it is very difficult to illustrate highly metallic beetles by conventional printing methods.

By its nature and due to Britain having a limited fauna this work will have limited appeal to the British Coleopterist. However, the wealth of biological information is invaluable and of course for anyone interested in the European fauna, its value will be greatly increased.

*The publishers offer a 10% discount to persons wishing to subscribe to the whole Coleoptera section of this series. (Available from the publishers, Scandinavian Science Press Ltd., DK-2930 Klampenborg, Denmark; and one assumes from leading Entomological Booksellers in Britain).

J. C.

Collins Guide to the Pests, Diseases and Disorders of Garden Plants by Stefan Buczacki & Keith M. Harris. Published by Collins, price £15.

This might be subtitled 'A defensive natural history of the garden'. It is intended for the gardener's bookshelf, to be used to identify the causes and treatments of a wide range of problems. There is an A-Z 'key' to the problems suffered by particular kinds of plants; followed by problem-by-problem details of symptoms, biology and treatment, under the main headings Pests (from eel-worms to deer!), Diseases (fungi, bacteria and viruses), and nutritional and other Disorders. Between these two parts are 24 colour plates showing examples. Some of Brian Hargreave's illustrations have not been reproduced very clearly, and photographed examples would have been better in many cases. The introduction gives brief details of treatment - distinguished as chemical and non-chemical and there is a short glossary and a bibliography. It would be useful for both gardener and naturalist to have Chinery's *Natural History of the Garden* (Collins 1977) on the same bookshelf as this one.

Habitat

Extinction: the Causes and Consequences of the Disappearance of Species by Paul and Anne Ehrlich. Published by Gollancz, price £9.95.

Until recently, species were evolving to replace those lost by extinction, but these processes are no longer in equilibrium largely because of man's greedy and often exploitive quest for progress. There is a sense of urgency in this book as one realises that the examples cited are very recent. Among the direct and indirect factors causing extinction are burgeoning populations, rainforest destruction, desertification and the historic and current threat of hunting animals. The consequences of such activities are described graphically with the reminder that the bug which is threatened today might be tomorrow's vital ally. The politics of extinction are explored in depth and economic conservation measures such as aquaculture and wild animal husbandry are described. The theme throughout is the need to arouse awareness and concern among powerful and political bodies so that they will come to regard the natural environment as a priceless resource. This book is lively, well-researched, and essential for all those who regard variety as the spice of life.

Habitat

Discovering the Countryside with David Bellamy. Coastal Walks. Published by Hamlyn, price £3.99.

This is a popular book at a popular price full of David Bellamy's enthusiasm and zest for the countryside, not a dry as dust identification book, in fact the exact opposite. Appreciation of the overall habitat first and painstaking individual identification later. A team of experts introduce the reader to six different stretches of coastline - sea cliffs,

shingle beaches, coastal marshes and estuaries, rocky shorelines and Bellamy's own seaside - his nearest beach in County Durham where he sorts through the succession of wracks on the sea wall and just gets his feet wet! The colour photographs by Peter Loughran are excellent, with detailed captions making the book worthwile even for those who might never read the full text.

Habitat

The Oxford Book of Insects (Pocket Edition) by John Burton. 212 pp., Oxford University Press, 1982. Price £2.50.

The Oxford Book of Insects was first published in 1968. This pocket edition contains the same text as the 1979 corrected reprinting but has been produced as a 6″ × 4⅜″ paperback with a water-resistant finish and as such is intended as a field identification guide for the non-specialist.

The book covers the whole of the British Insects so that the sections on the larger orders e.g. Hymenoptera or the more difficult of the smaller orders, e.g. Thysanoptera, cannot cover the subject more than very superficially. The butterflies are covered comprehensively. The text for the most part is succinct, accurate and informative. The coloured plates, which are arranged opposite the relevant text, have been reduced from the large format edition such that figures which were natural size are now × ⅔. This has resulted in some loss of detail but most species are still quite recognisable. Unfortunately the colour balance of some of the plates in the review copy is quite wrong, some figures appearing far too red but this is possibly a fault in this particular copy.

The final sections on Classification of British Insects, Orders of British Insects, Metamorphis of Insects and Protection from Enemies are concise and well written, but the bibliography at the end is in serious need of re-writing as it contains too many items which are out of print and difficult to obtain second hand, such as Ragge's 'Grasshoppers, Crickets and Cockroaches' and Beirne's Pyralid and Plume Moths.

This is a useful field pocket book for the general naturalist at a very reasonable price.

P. J. Jewess

The Theft of the Countryside by Marion Shoard, Maurice Temple Smith Ltd., 269 pp., 1980. Hardback, 0 85117 2008 (£9.00), paperback 0 85117 2016.

I first heard about this book long before I had a chance to read it; hence the belated nature of this review. It is useful to consider not only the book itself but also the hostile reviews and comments which it has provoked elsewhere. Surely, I thought, the book must include some

unreasonable and imbalanced statements for it to have earned such attacks, but having read it I am impressed by the care with which Marion Shoard has argued her case. Of course, care and logic are no substitute for tact, but I will not dwell on the attitudes of other reviewers.

The main theme of the book is the destruction (in the author's view) of the British landscape by farmers and foresters with all that this implies for wildlife, archaeological value and amenity. Thus it is her theme rather than her well expressed arguments which has put her in the firing line.

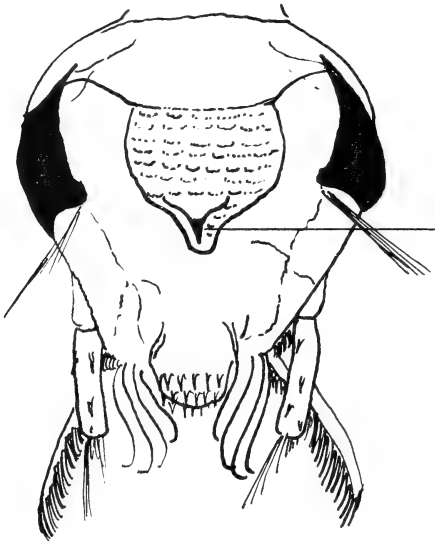
We are first given an explanation of the factors, both technological and financial which have led to the destruction of landscapes and ecosystems which until recently had developed relatively slowly and diversely. These changes are then powerfully illustrated in a series of chapters on hedgerows, hedgerow trees, woods, 'roughlands', downs, moors and wetlands. In anger and frustration Marion Shoard then proceeds to show how useless have been most attempts at legislation and education, although she does give credit to the National Parks scheme.

Turning to agriculture itself, the next part of the book tries to demolish the case for unbridled maximisation of home-produced food, and some compelling points are made here. For example, most of our arable land is actually feeding animals, a very inefficient way of producing food for humans. Naturalists may find the next part of the book the most inspiring because it deals with ways in which the wildlife, the archaeology and the general beauty of the countryside are being destroyed or shut off from people who have a very real need for informal enjoyment. Country parks and nature reserves are no proper answer according to Marion Shoard, convenient 'honeypots' though they may be for farmers who want to keep the public away from their land. Finally, she makes some very firm suggestions; bringing agriculture under the planning system, the erection of regional planning authorities, the designation of six new lowland national parks in place of the "almost meaningless" system of Areas of Outstanding Natural Beauty, and for the formation at an early stage of local action groups.

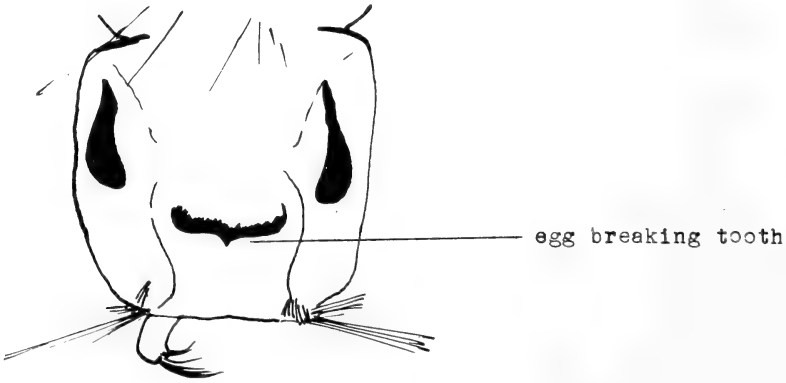
I can't do the book justice without mentioning in detail the very moving case studies which it contains, but I must leave these to the reader. Perhaps the most challenging thing for the reader is to decide what 'balance' really is. There is so much balance here, but so little conciliation. Perhaps conciliation is essential, but it is somehow refreshing to hear from a writer who is prepared to fight fire with fire.

D. L.

First instar larva, newly emerged.



Embryonic larva, extracted with ether from egg.



THE MOSQUITOES, A GROUP WORTHY OF STUDY

I consider the mosquitoes an interesting but neglected group. They are very accessible to those wishing to study them, due to their cosmopolitan nature, some species occurring in almost every imaginable habitat.

Due to their status as medically important arthropods, a great deal of information exists on the Culicidae. To illustrate all the members of this group would be impossible in one short article, so I will concentrate on one member of this group, the so-called "House Mosquito", *Culex pipiens* L.

C. pipiens breeds in natural or artificial bodies of water, which may be fresh, brackish or stagnant. It occurs at salinities of 0.1, 0.2 and 0.3 that of sea water. This capability appears to depend on the anal papillae which enlarge with increasing osmotic tension but the exact method has not been described. However, recognising this fact provides the keen field entomologist with a clue to the type of the habitat from which they come.

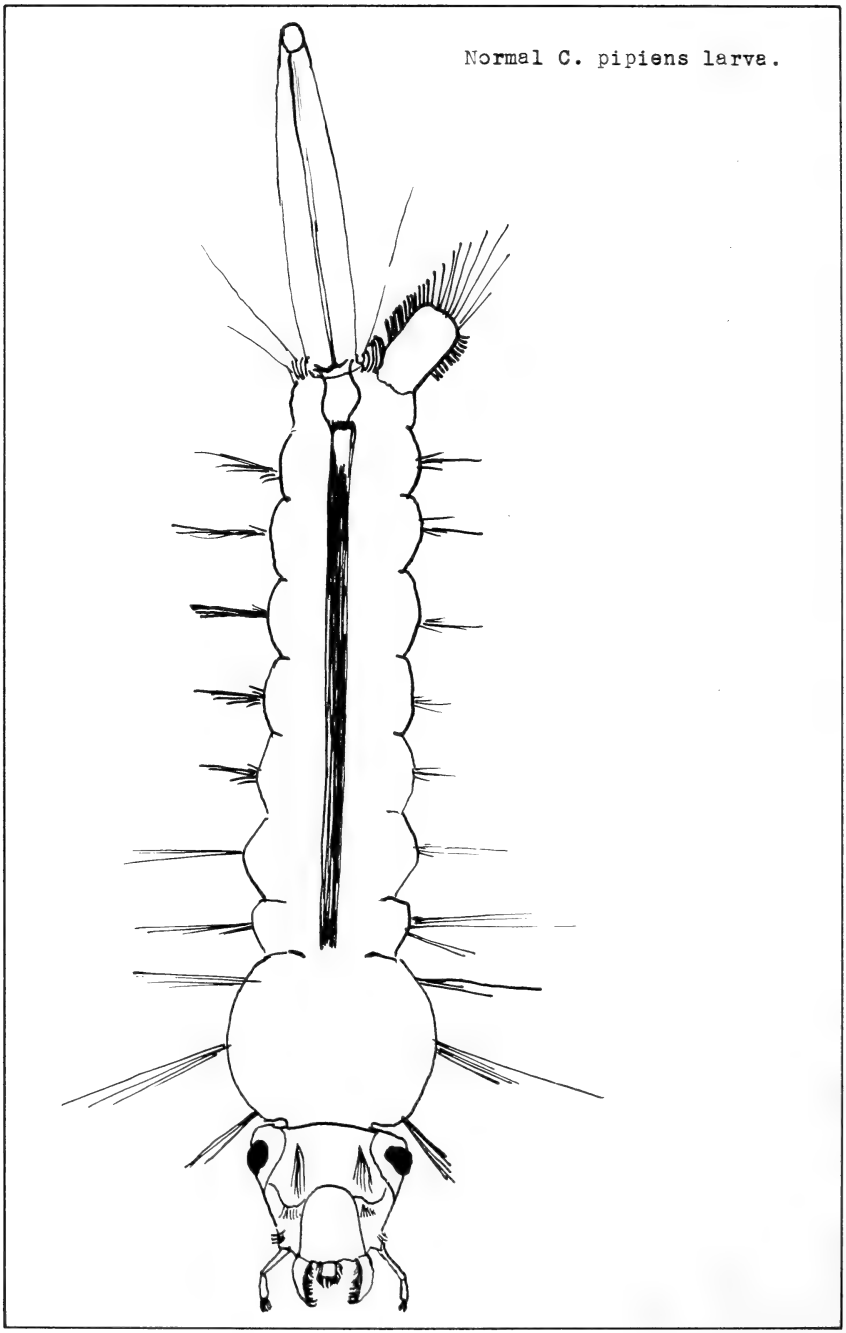
This species is widely distributed around the world, between 60° and 40° N, and is widespread in Britain. It enters diapause as an adult and overwinters mainly in man's houses or outbuildings and hibernates from October to April. It seems that whilst hibernating it frequently falls prey to spiders and an important ecological link may be present between the sort of spiders that enter outbuildings and the availability of *pipiens* as a food resource.

During the summer months, *pipiens* is active, feeding widely on various species of birds. This may seem a startling revelation but it has been conclusively confirmed by precipitin tests. The Black-headed gulls of Brownsea Island have been shown to have been bitten by this tenacious gnat! Indeed recent articles have also suggested that the bright yellow down of a newly hatched chick serves to deter mosquitoes.

The females of *pipiens* can produce one oviposition of about 200 eggs formed into a boat shaped raft without a blood meal but after this they must draw blood to produce a second, third or fourth batch of eggs. The reason for this seems to be a requirement for a specific sex amino acid which cannot be made in any other way. The males do not feed on blood and instead consume nectar from a variety of flowers.

The eggs of *pipiens* are remarkable structures. The wonderful complexity of the egg which has one water repellant end and one water attracting end and its membranes and elastic nature would take a complete article to describe. They are held in the raft, not by a cement or glue but by Lego block-like projections which lock the raft together.

The eggs increase by about 25% in length before hatching, indicating the elastic nature of the "shell". After 4 - 6 days, the eggs hatch and the


Normal C. pipiens larva.

first instar larvae, conspicuously marked with the egg breaking tooth in their head capsule, emerge. They feed by simply filtering the water around them. On either side of their mouths are feeding brushes, modifications of the palps. These move in a rhythmic sweeping fashion, drawing a current of water towards their mouths. Little information is available on their exact food. If a living larva is placed in a cavity slide or projection cell and is fed on fungal spores, yeast cells, diatoms, rotifers or protozoans, it will ingest them all.

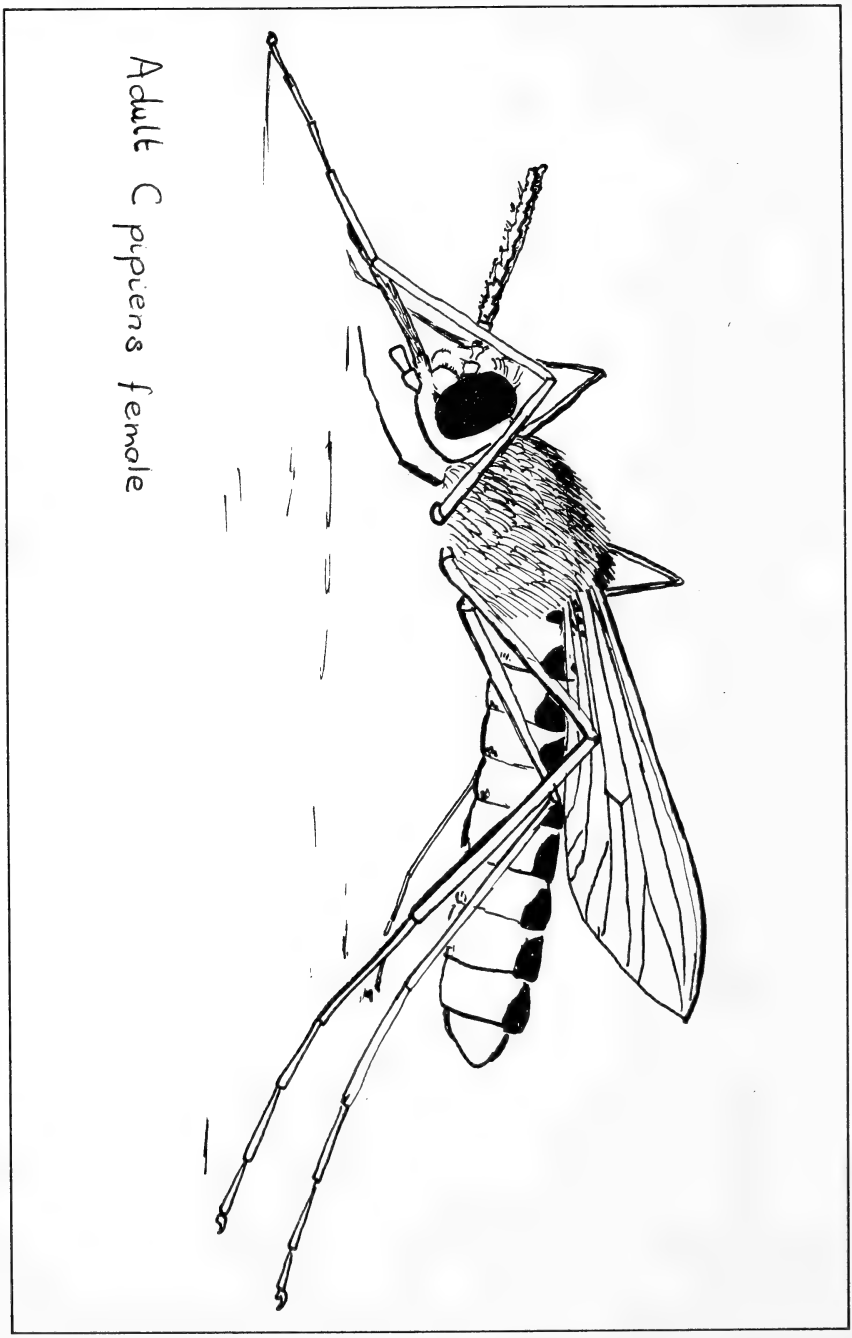
The larval syphon is provided with valves and is divided into two parts, these being the twin spiracles. Oxygen is passed through these to the tissues of the body. To enable the syphon to penetrate the surface film of the water in which the larva is living it has hydrofuge properties due to the presence of perispiracular glands. If you obtain a fourth instar larva and examine its syphon with a X 10 hand lens, you will easily see these glands at the tip of the syphon.

Four instars make up the larval life period. Although the head increases by a constant factor of 1.4, the soft parts of the body do not grow at a constant rate. Pupation occurs at any time from 29 to 51 days after emergence from the egg. The pupa is a whitish-grey colour, later hardening to a brownish-black colour. The pupa hangs from the surface of the water and is capable of diving rapidly with the aid of paddle-like structures at the end of the abdomen. Generally the pupae live passive lives unless disturbed, spending 2 to 5 days in the water before the adult emerges.

If five or six larvae are selected from a batch of newly emerged first instars, placed in a margarine-type tub and fed with a few drops of the liquor from a hay infusion added to the water in which they live, then a 'mini-strain' of mosquitoes can be raised. They are exactly the same as normal adults but are reduced in size by up to one half. This is also common in other Dipteran groups and is a ploy to escape population size reduction in periods of hardship. This is another fascinating feature of this insect group.

The adult females seem to be very selective in their choice of the habitat in which to deposit their eggs. They usually oviposit in unpolluted bodies of water and then only in those with a pH of between 6.9 and 7.4.

Predators and parasites of *pipiens* are many. The adult insects form a major part of the diet of insectivorous birds and spiders. The larvae, ovae and pupae are also consumed by mallards, many species of fish and flatworms, the Greater water boatman and predacious mites. The largest single predator does seem, however, to be a humble life form, a parasitic fungus.


Adult C pipiens female

C. pipiens pupa.

I hope this brief account will stimulate many to look with new interest at the small, downy brown flies which enter their houses or outbuildings in Autumn. Many details have been omitted to make this account suitable for the amateur but could easily be discovered by resource to the literature named in the bibliography.

N.S. Folkard (5764)

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THE TWENTY-PLUME MOTH

The exact systematic position of this attractive little moth (*Orneodes hexadactyla* L.) is somewhat obscure. Some authorities put it amongst the Tineids whilst others include it in the Pyrales. Since it is included in the latter in recent works on them it would seem that it is most nearly related to that family. It is however a member of the separate family, Orneodidae.

The adults cannot readily be mistaken for any other moth, each wing being divided into six separate plumes. In the Pterophoridae no more than three plumes occur on any one wing. One must look for the eggs which are laid on the outside of the buds of honeysuckle (*Lonicera periclymenum)* in April, May or even, in a late season, June. They are at first white in colour, gradually turning to orange just before hatching. The newly hatched larva burrows into the flower bud wherein it feeds. Beirne, in *'British Pyralid and Plume Moths'* states that it feeds mainly on the pollen. It has also been said to eat the stamens and pistils of the flower and to mine in leaves. Further observations on its feeding habits would be very useful. When one bud has been eaten the larva moves on and burrows into another. It is pinkish in colour, with the head darker and spotted with an even darker brown. Pupation takes place just under the ground in a cocoon. The larva can be found by collecting honeysuckle buds in June and July. The moths emerge in August, and go into hibernation in October, reappearing in April. Some may also take to flight on mild sunny days. Hibernation occurs chiefly in dense thickets; creepers, such as ivy or virginia creeper; haystacks; thatched roofs and barns. In the days when such things as thatched roofs, haystacks and creepers up house walls were very much commoner than they are today, all the older books that (briefly) make mention of this species state that it is generally common and may readily be beaten from its hiding places, especially in late autumn. But what is its present day status? Its former stated habitats are now few and far between compared with what they were in Victorian days and I have certainly very rarely come across it, even when I have located the correct habitat. Also the only foodplant recorded is one particular honeysuckle. Today a considerable quantity of other species of honeysuckle, some of them evergreen, have been imported from abroad and are fairly widely grown. It would be of interest to know whether or not the early stages have as yet been found on any of these importations and also to have records of the present distribution and status of this lovely little moth.

Brian O. C. Gardiner (225)

PUTTING YOUR DEEP-FREEZE TO GOOD USE

Your editor has recently had several communications on the use of deep-freezing as a method of killing specimens and indeed has already advocated its use in the recently published new edition of the *Silkmoth Rearer's Handbook*. We give below the comments of two members who are using the method. Your editor's experience, however, is that the specimens are best "papered" first, as they then all die with wings folded and not "everted" (which makes them difficult to set). If any other members have observations to report on the method, then the Bulletin would be an ideal place to publish them.

FREEZING OF SPECIMENS

Due to family commitments etc. during the Summer season, time is of the essence when it comes to collecting and breeding specimens. I have therefore developed a process which enables one to carry on the interest through the Winter months.

Over the past two seasons I have successfully achieved the method of freezing my specimens by placing them in an airtight plastic container. The plastic reduces any condensation forming on the sides, preventing the specimen, should it make contact, from sticking to the container. Another prevention, should it prove necessary, is to use a small amount of Silica Gell.

I have successfully frozen Silk Moths, Butterflies and Dragonflies (in the small compartment of my refrigerator).

One of the benefits I have found by using this process is that the bodies tend not to shrivel up as they would do ordinarily.

This method of storing has proved to be a great benefit and has also extended my interest throughout the year.

Stephen Beswick (7521)

FREEZE — RELAX!

When I was staying with one of my entomologist friends some little time ago, I noticed that when he kept any specimens from his MV trap after logging the night's catch, after killing them he immediately layered them between tissues in plastic fridge-boxes and put them into his deep-freeze.

He explained that by this method freshly-killed unset moths remained perfectly relaxed for an indefinite period, provided that they were kept deep-frozen, ready for when a convenient time presented itself for setting them, which in his case had to be fitted into a very busy work schedule. All one had to do, he said, was to thaw them out, and they would be in a beautifully supple condition for setting.

My friend was quite surprised to find that I had never heard of this method before, despite the length of time I have been collecting, breeding and studying Lepidoptera and the very extensive reading I have done around the subject.

My friend also said that, should one run out of one's normal killing agent, in an emergency moths can be killed simply by being placed, in individual pillboxes, in the deep-freeze and left for a while.

On my return home I decided to put my friend's ideas into practice and test the results for myself, using the freezing compartment of my fridge-freezer, which he said would be equally suitable (but not the lower fridge part). I found that, just as he had said, moths remain in excellent condition for setting, just like freshly-killed specimens (after defrosting), at any subsequent time. In fact, just prior to writing this article, I have been setting a number of specimens which I deep-froze (in the freezing compartment of the fridge in our holiday caravan) during our collecting holiday in July, and I would go as far as to say that I find this method infinitely superior to my previous method of relaxing specimens between layers of damp kitchen paper towels in a biscuit-tin. The freezer method also completely eliminates any possibility of mould.

As far as killing by deep-freezing is concerned, I tried it experimentally only and am not really convinced of its efficaciousness, unless perhaps specimens could be left in the freezer for several days. Butterflies of those species which hibernate through the winter, left in the freezer overnight, revived the next day in minutes when their pillboxes were removed to room temperature! I think I will stick to my usual chloroform.

Does anyone else use the deep-freeze for relaxing specimens? It would be interesting to compare notes.

By the way, I think I should mention one possible snag. The old hand such as myself, who takes only a few specimens, may encounter no problems. But the enthusiastic beginner, who takes rather more to fill his growing collection's blank spaces, may soon find his irate mother, or wife, complaining that there is not enough room in the freezer for the food!

S. J. Patel (751)

NOTES AND OBSERVATIONS

Small tortoiseshell *ab semiichnusoides* in Yorkshire — All my life I have been an amateur naturalist, but a collector of lepidoptera only for two years since I became a senior citizen; now the only specimens I take are aberrations.

Imagine my thrill, pleasure and amazement to net in Bridlington, Yorkshire, in July last year, a male specimen of the Small tortoiseshell (*Aglais urticae* L.) which is almost identical to *ab semiichnusoides* Pronin as figured on Plate 18 of A. D. A. Russworm's *Aberrations of British Butterflies,* except that my specimen has plain brown lower wings, and no white at the apex of the forewings; the underside is almost identical with his. This has become my prized possession, for surely it must be a rare capture. — E. Ardon (7412).

Irish Clouded Yellows — I would like to place on record the sighting and capture of three male specimens of the Clouded yellow (*Colias croceus* Fourcroy) at Farnes, Castlemaine, Co. Kerry. Two on the 13th and one on the 15th of August last year. I have never before recorded this species in this area, or indeed anywhere else in Ireland, and would be very interestedd to learn of any other Irish records in recent years — John W. Lavery

Pooter, or an AES 'First' — In the April number of our contemporary *Antenna,* the question of the first publication of the use of the word 'Pooter' was raised, with the suggestion that it originated at Imperial College and that the writer could find no reference to it before the 1960's. In fact the word was in good use a couple of decades before then and the earliest publication of it I have been able to locate is in 1939 when the first printed volume of our Journal *The Amateur Entomologist* was published. It occurs in Vol. 4, p. 33, where it is used in an article on Ant collecting by F. J. O'Rourke. (Was he perhaps a member of Imperial College?)

Two members of staff of the British Museum (Natural History) clearly had differing views on the use of the word, for John Smart ignors it a year later in his *Instructions for Collectors No 4A: Insects* (1940) and uses the term sucker, with exhauster and aspirator as synonyms. He has also informed me personally that he did not, and still does not, like the word. J. F. Perkins, on the other hand, clearly defines the word in our *Hymenopterist's Handbook* (1943) when describing apparatus required for collecting. He quotes it thus:- POOTER — A glass pooter or aspirator . . . Unless anyone knows of an earlier reference, therefore, the credit of priority of the use of the word must go to F. J. O'Rourke in the first printed volume of an AES Publication — Editor.

Halvergate marshes saved — We are pleased to announce that, without holding an expensive public enquiry, the Government has decided that these valuable natural marshes in Norfolk, the danger to which we have made reference in previous Bulletins, should be left as they are and permission for the farming interests to drain further extensive areas has been refused — Editor.

A note on pupal coloration — One observation made during the breeding of *P. machaon,* both British and Continental, is the apparent ability of the pupa to take up the colour of its background. On several occasions I have split pupae up in the last instar, placing some in with fresh green fronds of fennel and others with brown stems. In the first case the pupae are green with yellowish markings, in the second they are various shades of whitish-brown with chocolate markings. This year I had a solitary pupa on the black muslin over the cage and this pupa was almost black. It seems that the larva when it spins up ready to pupate is able to appreciate the colour of its background and is able to produce a similar coloration in its pupal casing. The soft case is green but soon takes up the colour which will be the final one. No change takes place after hardening is complete. I have found a similar occurrence with the Wall butterfly, *Lasiommata megera* L. Pupae which form amongst the grasses are green with gold studs, those that form down at the roots amongst soil and other debris are black with gold studs.

P. W. Cribb (2270)

Great spruce bark beetle arrives in Shropshire — From the pages of *Habitat* we learn that several areas of woodland within 50 miles of Ludlow, Shropshire, have been attacked by the Great spruce bark beetle (*Dentroctonus micans*) and that this beetle could cause as much damage to Sitka and other spruce trees as has been suffered by our elms. Many infested trees have already been felled and aerial surveys for its presence carried out. The beetle is native to northern Europe and likely arrived in only partially debarked imported timber — Editor.

Painted Lady in Cornwall — Whilst sitting on the sands at Portholland, Cornwall (SW 958412) during the morning of 16th September, 1982, a specimen of the Painted Lady butterfly (*Cynthia cardui* L.) settled on the sands about 10ft from me; the sand was moist from a fresh water stream which was running down to the sea — A. J. Baldwin (5954).

Unusual foodplant of Marsh fritillary — Having no Devil's-Bit Scabious, I gave my Marsh fritillary butterflies (*Euphydryas aurinea* Rott.) Garden Scabious (*Caucasica*) and Teasel. They laid at least six batches of ova on Teasel. The larvae are now in hibernation and I look forward to next year when I should be able to offer them both Teasel and Devil's Bit Scabious to see which they will choose —

Rosemary Borthwick-Clarke (7283)

Some observations on the breeding of the Swallowtail — While in Var with David Marshall in May last year (1982) I netted a female *Papilio machaon bigenerata* Vty. which was in the act of egg-laying. She was placed into a 4-litre ice-cream tub with some sprays of fennel and covered

with netting. This was placed in dappled sunlight by the camper and I sprinkled her with water from time to time. Within two days I had forty eggs and she then died. On dissection she was found to have no more ova. The eggs hatched on our way back to England and fed up successfully on garden fennel. The second generation insects started to emerge at the end of June, none lying over, and these were hand-paired and further eggs were obtained. The larvae again fed up quickly and had all pupated by the first week in August. I assumed that these would now lie over until the following spring and placed them into a perforated tin and put this in our leanto which is cool, shaded and well ventilated. On the 5th September I opened the tin to show one of our members the pupae, only to find that five of the papae had emerged and the bedraggled imagines, wings crumpled and wet with meconium, all died within forty-eight hours despite being fed. I moved all the pupae into an emerging cage and on the 9th September two more females emerged. The breeding had been done outside, sleeving the larvae onto fennel plants so that conditions were fairly natural. Weather had been dry and warm but not over hot so that it would appear safe to presume that *P. machaon* in Europe probably produces a third generation which is partial while the second generation appears to be almost a complete one. Other members observations would be of interest — P. W. Cribb (2270)

A butterfly and moth watch — On Saturday 17th July, 1982, I decided to observe the butterflies visiting the flowers and budleia bushes in our garden. We live in the centre of Binfield, and are surrounded by other gardens. The weather was hot and sunny, and I took up my position at 11.00 and kept a record till 13.00. The first visitor was a freshly emerged Comma, and was closely followed by a number of Small tortoiseshells, Large and Small whites, two Speckled woods, Wall browns, a Large skipper, a Grayling and a Red Admiral. But the most exciting was a beautiful Hummingbird hawk moth. It fed, while it hovered, from the buddleia. Then from the honeysuckle, where it rested on the wall.

The evening was calm and still, so I went into the garden about 22.00 with a torch. The moths were mainly Dot moths, Silver Y's, Figure-of-eights and Yellow underwings.

Then suddenly I saw a huge Convolvulous hawk moth hovering beside the Phlox. Its huge tongue, over 7 cm long, dipped into each flower. I could not believe my luck as I know these are rather rare in Britain. It did not seem to mind torch-light, but soon flew away across the garden. This was certainly a day to remember — Lisa Bunker (7011J).

Hummingbird hawkmoths in Hertfordshire and in Wales — On the 26th and 28th of July, 1982, Mr and Mrs Tapper of Garway, S. Hereford saw, on both dates, a single Hummingbird hawkmoth, (*Macroglossum stellatarum*) hovering and feeding from their buddleia bush for about an hour.

On 31st July, my sisters, Andrea and Susan, saw a hummingbird hawkmoth hovering above some ragwort at Porthcawl on the South Wales Coast.

I should be interested to hear of any other sightings of this moth —

Theresa Strange (6721)

Occurrence of Green hairstreak in August — whilst camping in the middle of Exmoor and sunbathing with net at the ready, I barely noticed an inconspicuous butterfly flying about a foot above the grassy moorland.

Upon capture, I could not readily identify it, both topside and underside being dark brown, a sprinkling of green scales on the underside of the forewings, with intense green at the underside base of both wings.

After consulting South upon my return home, I can only conclude that it is a Green hairstreak *Callophrys rubi* L. (ab. *brunnea* Tutt), which according to South, the change of green to brown being "ascribed to the action of moisture" - a possibility since it was caught at 1400 feet. However, a more unusual aspect is that it was caught on August 3rd, 1982, the typical times being May/June with South stating possibly as late as mid July — B. D. Baxter (6009).

Old Ladies — The habits of *Mormio maura* L., The Old Lady moth, are known to many a moth hunter. Some years ago while in the Basses Alpes I was swimming in a small mountain stream and noticed a small cave above the water. I scrambled up to put my head inside and was nearly knocked backwards by a swarm of Old Ladies which rushed out into the sunlight. The next day I returned to the spot and was more cautious. In the roof of the cave there must have been thirty or more moths clustered in a carpet over the roof. This autumn I have noticed several hiding in crannies in the buildings where I work and amusingly three of them in one of the public ladies toilets, one on the seat itself. Perhaps this is where that jingle 'Oh dear what can the matter be, three old ladies locked in the lavatory' originated — P. W. Cribb (2270).

Girdle formation in Swallowtail — Amongst the Pieridae it seems that the girdle or cincture which secures the larva to its support when preparing to pupate is spun by the larva securing the silk thread to the

support then passing it behind its body and securing it to the support on the other side. In the case of *P. machaon* (and possibly other *Papilio* species) the larva makes the girdle in a loop in front of its body and then passes its head and fore part of the body through the loop. Mrs. Margaret Beer first mentioned this difference to me and observation confirms that this is the normal method with the Swallowtail. I would be interested to hear from other members who may be breeding *Papilio* species from other parts of the world as to what the practice is with them — P. W. Cribb (2270).

NOTES FROM THE GLASGOW AREA

I was walking in the Bishop Loch area which at its eastern end has an extensive area of reed-beds with willows and sallows, and some birch, growing near the edges of the reeds.

On one of the sallow bushes I found a small larva of the Sallow kitten moth. This was my first encounter with that species. The larva was crawling over the broken part of a sallow stem. It is feeding very well on sallow leaves in captivity, I think it is about full-grown now and I have supplied it with pieces of sallow stems for pupation.

The following day - 10th August, which was warm, with a strong breeze from the west - I was out and about the same area, i.e. Lochwood. At the edge of a cornfield, I noticed a White ermine caterpillar crawling over the ground. Further along, on a hawthorne tree, I found a Grey dagger larva nearly full grown. Both caterpillars I collected, and put in containers I had with me. I had gone out that day with the intention of looking for caterpillars and also noting other creatures and plants of natural history interest, in that area.

Feeling tired later on, I lay down by the side of a stream, and fell asleep.

When I awoke from my slumber, I walked towards some rough pasture on raised ground near the stream. I had walked just ten yards when I saw a lovely full-grown caterpillar of the Sweet-gale moth, crawling over the ground, near the top of the stream embankment. I put it in a container with some willow leaves. When I sat down five minutes later, on a grassy shale bank, to examine my find, a chap with his two children and dog came along. I explained I was an entomologist to the man, and they admired the beauty of the sweet-gale larva, and passed on their way. A few minutes later the chap came back and handed me another sweet-gale. He had found it on some chickweed at the edge of the cornfield, which is bordered on that side with willows and birches. This larva was also about full-grown and it was lighter in colour than the one I had found earlier, being generally light reddish-brown. The other markings, including the white spots contrasted very well with the ground-colour of both larvae.

I think the sweet-gale caterpillars may have been blown from nearby trees, or they had been searching for a place to pupate. The wind was pretty strong and contained much thistledown, and other air-borne seeds. (The "gale" certainly brought me "sweet" success that day??)

The sweet-gale moth belongs to the moth family Acronictinae most of whose members feed on indigenous decidious trees and shrubs like willow and birch, and others such as fruit trees like hawthorn, apple, etc, and even plants such as heather and of course bog-myrtle (sweet-gale). Many of the species are brightly coloured and very beautiful in the caterpillar stage and are usually to be found during late summer and autumn. The day before had been very warm and sunny, but with no wind. Where I found the first sweet-gale caterpillar was at least 30 yards from the nearest tree, which was a small sallow; in the opposite direction, to the east, there were no trees at all in the vicinity, only the rather busy M73 motorway which runs north to south, bisecting the lovely countryside around there. I've written a short piece of poetry about my good fortune in finding and seeing such beautiful creatures, as I did that day.

Sweet-gale fortune arrives on the

thistle down wind

From across the water-meadows

And willowy marshes.

Frank McCann (6291)

GENERAL OBSERVATIONS ON RHOPALOCERA IN CENTRAL SWITZERLAND (BERNESE OBERLAND) IN EARLY JULY 1981

The irresistible lure of an Alpine camping holiday centred at Lauterbrunnen during the first two weeks of July 1981 with a small party of members of the Alpine Garden Society, of which I am a recent member, was just too good an opportunity to let slip by, and with the active encouragement and leave of my long-suffering wife I duly joined the party at the outset of our journey on 28th June. Apart from a short Channel sea ferry crossing to Calais our itinerary involved travelling together in a mini-bus across northern and eastern France with one night camping stop at Chalon-sur-Marne and thereafter, during the next day travelling down through the districts of Haute-Marne and Haute Saône before crossing into Switzerland near Pontarlier in mid-afternoon. After a short journey in Switzerland passing through Neuchatel and by-passing Berne we reached the camping site in Lauterbrunnen in the early evening.

Dreary wet weather prevailed for almost the entire journey until we reached the Swiss border, when summer sunshine greeted us and remained with us for most of our fortnight's holiday.

Lauterbrunnen (796 m) is a popular Swiss resort lying south of Interlaken in a broad glacial valley flanked with steep walls of limestone schist. The spectacular chain of peaks comprising the Eiger, Mönch and Jungfrau lie behind the valley to the south east and are clearly visible from the small, well-known village of Wengen on the north-eastern slopes of the valley. At the southern extremity of the valley (Lauterbrunnental) lies the small scattered village of Stechelberg (910 m) from which well defined tracks lead up to high summer pastures at various altitudes. Above the south-western end of the valley lies Mürren (1600 m) an attractive village which is reached principally by rail from Lauterbrunnen, although there is also access by cablecar from Stechelberg.

Due to prolonged periods of sunny weather and the absence of undue wet conditions throughout the two-week period, I was not only able to enjoy a full botanical survey of a number of diverse Alpine habitats within a wide radius of Lauterbrunnen, but also to carry out an interesting study of Rhopalocera within certain local areas.

However, as much of the lower summer pastures had been cut, there were few butterflies to be seen around Lauterbrennen, and only amongst the higher elevations below Wengen and above Stechelberg, as well as amongst the high Alpine summer pastures and scree above Mürren and below the Schilthorn peak (2960 m) were there to be found any appreciable number of species.

For the sake of this article I have confined my observations to the following areas and will refer to each where necessary by its general heading as each area was in fact distinct in character:-

(1) WENGEN DISTRICT

Small sheltered lower summer pastures of uncut hay with an abundance of Alpine flora below Wengen at an altitude of 900 m lying within a wide belt of deciduous trees and scattered conifers. This area lay close to Lauterbrunnen and was easily approached by various well used paths and tracks, which afforded me the opportunity to study general Alpine Rhopalocera, which are widely distributed throughout central and northern Switzerland. My observations were carried out on 30th June and 2nd July.

(2) SCHILTTAL DISTRICT

A wide area of overgrown scree and old glacial terminal moraines below the Schilthorn and comprising the head of a broad valley (Schilttal) lying above Mürren. Average altitude was 2200 m. This

area was treeless but rich in high Alpine flora and light scrub (Alpenrose and *Vaccinium* ssp.). My observations were carried out on 1st July and 8th July.

(3) MÜRREN DISTRICT

Rough high summer pastures within a wide belt of conifers and bounded by steep mountain scree and rocky enclaves lying to the north west of Mürren and above Lauterbrunnental. This area, although scenically attractive was not very productive by reason of recent presence of cattle and limited flora. Altitude was between 1500 m and 1900 m. My observations were carried out on 5th July.

(4) STECHELBERG DISTRICT

Steep high summer pastures with abundance of Alpine flora below a variable belt of conifers lying above Stechelberg. Average altitude was 1200 m. My observations were carried out on 7th and 9th July.

PAPILIONIDAE

Papilio machaon bigeneratus Vty.

One male imago sighted in Stechelberg District. This species is likely to be widely distributed throughout the region and more abundant in late July and August.

Parnassius apollo L.

A small number of male imagines were sighted in Wengen District during the first week and in Stechelberg District towards the end of the second week. Imagines displayed a more general fuscous coloration than many other forms and the hindwing ocelli on the upper sides often appeared to be pale pink with central white pupils and were seldom conspicuously large. This species is likely to be widely distributed throughout the region from mid-July onwards until late August. No female imagines were encountered; these are believed to be more heavily marked with extensive grey suffusion in the marginal, discal and basal areas of the upper side of both fore and hindwings and the hindwing occeli are likely to be larger and more brightly coloured.

PIERIDAE

Pieris brassicae L.

A small number of male imagines were found in Stechelberg District and close to Lauterbrunnen. This species is likely to be more abundant in lower districts in early June with second brood insects appearing later in August and September.

Pieris rapae L.

Two males were found in Stechelberg District. This species is likely to be restricted by altitude factors and unlikely to be encountered above 1200 m.

Pieris napi bryoniae Hübner

A limited number of male and female imagines were found in Mürren District only. This species is likely to be more abundant in pastures elsewhere above 1500 m and is likely to be widely distributed.

Pontia callidice Hübner

Two male imagines were found in worn condition in total isolation on the higher slopes of the Schilthorn close to an extensive area of snow at an altitude of 2600 m. This species is confined to high exposed mountain slopes above 2000 m and displays a strong but erratic flight habit, and is able to withstand windy conditions at such altitude levels. This species is likely to be more frequently encountered as individual specimens later in July.

Anthocharis cardamines L.

Two males were sighted amongst light scrub and conifers in Wengen District. This species is certainly likely to be widely distributed elsewhere amongst lower pastures and wasteground areas during June and possibly earlier.

Colias phicomone Esper

This species was widely distributed in both Mürren and Stechelberg Districts above 1000 m. Both male and female imagines were sighted, and this species is likely to be very common around open stretches of pasture in late July and early August. This species displays a very erratic and restless flight pattern and seldom came to rest on flora for any length of time.

Gonepteryx rhamni L.

One male was sighted in Wengen District. The species is likely to be more abundant and widely distributed throughout the Lautenbrunnental district and elsewhere.

Aglais urticae L.

This species was widely distributed throughout the region and was often seen in small numbers at very high altitudes including the peak of the Schilthorn.

Polygonia c-album L.

One male was sighted in Wengen District. This species is likely to be widely distributed around wooded slopes in the Lautenbrunnental district and elsewhere.

Mesoacidalia aglaja L.

This species was widely distributed in both Wengen and Stechelberg Districts. Few females were seen and are perhaps likely to be more in evidence in later July and early August.

Fabriciana adippe D. and S.

The distribution of this species appeared localised and confined to Wengen District. Both sexes were recorded.

Fabriciana niobe L.

This species was widely distributed in both Wengen and Stechelberg Districts. Form *eris* Meigen was found to be not uncommon amongst male examples. Many were however, worn in character which tended to show that this species was nearing the end of its flight period.

Boloria napaea Hoff.

This species was confined to both Mürren and Schilttal Districts and was rarely seen below 1700 m. Colonies appeared to be widely distributed in these districts and both sexes were sighted frequently in flight together in full sunshine.

Clossiana titania cypris Meigen

This attractive species was widely distributed in both Wengen and Stechelberg Districts wherever there was an abundance of flora. Both sexes were sighted. Few were found above 1500 m and rarely did they penetrate into woodland areas.

Clossiana selene D. & S.

Two males in worn condition were found in Wengen District only. This species is certainly widely distributed, but more likely to be encountered in early June.

Melitaea diamina Lang

A very limited number of male and female imagines were found in Stechelberg District. This species is likely to be restricted to damp sheltered areas of pasture and wasteground from mid-June onwards. I did notice that the males were not so heavily dark in colour as compared to colonies which I found in central Austria some years ago.

Mellicta athalia Rott.

This species was widely distributed in Wengen District. A small number of scattered colonies were also found in Stechelberg District in damp wasteground areas. Markings were generally well defined on upper side of both fore and hindwings, although some males did display heavy dark fuscous suffusion towards basal area of both fore and hindwings. Females were generally larger in size and displayed less suffusion and bitonal shades of fulvous coloration in post discal and discal areas of the upper side of both fore and hindwings.

SATYRIDAE

Erebia ligea L.

This species was widely distributed amongst light deciduous and coniferous woodland belts in Wengen District and also particularly common in Stechelberg District above 1200 m. Few females were sighted in view of the early timing of my visit.

Erebia euryale Esper

The distribution of this species was more restricted than the previous species, although both were encountered in flight together in Stechelberg District. The post discal brick red band on the upper side of the forewings was generally well developed with dark venation. Conspicuous blackish ocelli were generally present in 2nd, 4th and 5th spaces of both upper and undersides of the forewings. A less conspicuous post discal band was also often present on the upper side of the hindwings with a regular series of dark small ocelli displayed within. The black and white chequered cilia on the marginal region of both fore and hindwings were not always clearly defined.

Erebia manto D. & S.

This variable species was only encountered in flight as a restricted and perhaps local insect in Stechelberg District. The interrupted post discal reddish band on the upper side of the forewings enclosing small black ocelli was generally well developed. Some males displayed, however, reduced markings which can easily cause confusion over identification. The orange-yellow post discal spots on the underside of the hindwings were generally well developed in spaces 4, 5 and 6. The forewings were also generally large with wingspan of 21 mm or more from apex to base. I found this species to be easily confused with *E.epiphron* in this district as the latter was also surprisingly large and markings on the upper side of the forewings were similar but tended to be enlarged towards the apical area.

Erebia epiphron aetheria Esper

This sub-species was only encountered in Stechelberg District, although I suspect it is more widely distributed elsewhere in the region. As indicated above, imagines were easily confused with *E. manto* in the field. However, the post discal band was usually restricted to spaces 4 and 5 with sometimes a vestigial red brick spot in space 2. The twin black spots in spaces 4 and 5 were often well developed. The underside post discal band was usually obscure and often so vestigial as to be scarcely discernible. The wingspan of the forewings was generally large with measurements of 19mm or slightly less from apex to base.

Erebia pharte Hübner

This distinctive small species which displays a regular series of elongated blind fulvous post discal spots, was widespread on scree in Schilttal District. A few males were also found in Mürren District above 1900 m and two male imagines were also found in Stechelberg District above 1200 m which is perhaps a low altitude for this species. No females were recorded.

Erebia aethiops Esper

This widely distributed species was only recorded as existing around Stechelberg District above 1200 m where males were reasonably common.

Erebia gorge Hübner

One solitary worn female was found in Stechelberg District. Post discal band was very wide on the upper side of the forewings and extended to distal point of discoidal cell with two small white centred ocelli in spaces 5 and 6. Upper side of the hindwings were strongly irrorated in grey and off-white creating a marbled appearance. This species may be widely distributed in this locality and may have an earlier flight period than most *Erebia* species.

Erebia meolans stygne Ochs

A very small number of males were encountered in flight in Stechelberg District. This sub-species is probably widely distributed elsewhere in districts lying to the east and north of Lauterbrunnental. All displayed a reduced and irregular red post discal band on the upper side of the forewings with two apical black spots enclosing small white pupils. A third diminutive white pupilled spot was also present in space 3.

Erebia meolans valesiaca Elwes

Two small males were found in Mürren District at 2000 m. This sub-species comprises part of a cline of regional forms which do not always show constant features, and *valesiaca* is perhaps the least stable. In general the markings and coloration are very similar *stygne* but the post

discal band on the upper side of the forewings is severely reduced to red rings surrounding the two apical spots. The third spot is so vestigial as to be almost absent. Furthermore, this sub-species tends to be small in comparison to *stygne* and other prevailing European forms and is more widely distributed as a high Alpine form in central and southern Switzerland beyond the Valais District.

Erebia pandrose Bkh

This species was widely distributed above 2000 m below the Schilthorn around scree and high pastures. Markings and coloration were remarkably constant despite such obvious wide distribution. This species has adapted itself to very high and exposed montane districts and is particularly active in strong sunshine.

Maniola jurtina L.

This common species was entirely restricted to local low pasture pockets below Wengen and in Lauterbrunnental.

Coenonympha gardetta de Prunner

This widely distributed Alpine species was not fully on the wing at the time of my visit, and I was therefore not surprised to encounter imagines in small numbers only in both Wengen and Stechelberg districts.

Lasiommata maera L.

This distinctive species was widely distributed amongst lower scree and wasteground areas around Lauterbrunnental and Stechelberg Districts. Imagines were rarely seen above 1200 m.

LYCAENIDAE

Heodes tityrus subalpinus Spever

Only two male imagines were found in Wengen District above 1000 m. It is likely that this widely distributed species is common elsewhere and is more likely to be encountered in later July and August.

Albulina orbitulus de Prunner

Two males were encountered in flight along a rough mountain track in Mürren District above 2100 m. This localised species is likely to be confined to rough stony areas above the general tree line and more widely distributed in alkaline districts. Only males display the bright iridescent blue coloration on the upper side of both the fore and hind wings; the females display general brown coloration with a light blue basal flush on the upper side of both sets of wings.

Agrodiaetus damon D. & S.

A few males of this attractive species were only encountered fluttering around a wide mountain track in Stechelberg District. The distinctive feature which makes identification easy, is the presence of a firm white streak along vein 4 stretching from base to close to the marginal area on the underside of the hindwings; the remaining coloration of such undersides is ochreous or sandy in texture, and the basal and post discal spots present are generally vestigial. The upper side of the forewings displays a bright pale blue with broad fuscous marginal areas. In general appearance this species can be confused with *L. coridon* Poda in flight. This species is likely to be local and confined to restricted habitats comprising sheltered pockets of stony wasteground at altitudes of 1000 to 1500 m with a partiality to calcareous or alkaline regions where its food plant (*Onobrychis* spp.) is plentiful.

Polyommatus eros Ochs

A few males were discovered in flight with *A. damon* as described above, although I did note this species favoured damp patches on the path and was more confined to lower stretches of the Stechelberg District. The males are smaller in general than *P.icarus* Rott. and display a bright blue/turquoise coloration with broad black marginal borders on the upperside of both the fore and hindwings. The underside of both sets of wings are almost indistinguishable against those of *icarus*.

HESPERIIDAE

Much to my surprise only one species of this family was recorded throughout the holiday; this was *Ochlodes venatus faunus* Turati which was reasonably plentiful in Wengen District. Perhaps the timing of my visit was a shade early to enable me to find other indigenous species in the region.

GENERAL CONCLUSIONS

The variety of species and numbers of imagines encountered were perhaps surprisingly limited for a region of Switzerland which geologically was rich in flora associated with alkaline conditions. My observations were, however, restricted by there being limited areas of uncut summer pastures and wasteground which were easily accessible to the visitor: much of the lower summer pastures had been or were in the process of being cut, and this necessary agricultural activity inevitably reduced numbers of insects on the wing. Earlier poor spring weather conditions may also have adversely affected emergence of many species in the region. However, the number of Erebia species identified was rewarding and worthy of more sustained study. Even if Rhopalocera life was at a premium, I certainly harboured no disappointments over the wealth of Alpine flora discovered, which afforded me ample opportunities to improve my photographic abilities in such resplendent Swiss scenery with Eiger and Jungfrau never far away.

N. F. Gossling (5169)

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This is the same venue as last year and it is hoped that this advance notice will enable Members to plan projects and exhibits for the Exhibition.

Maps and full details will appear in the August, 1983, AES Bulletin.

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THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

WORLD LIST ABBREVIATION:

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EDITOR:

BRIAN O. C. GARDINER, F.L.S., F.R.E.S.

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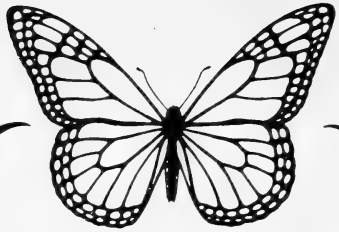

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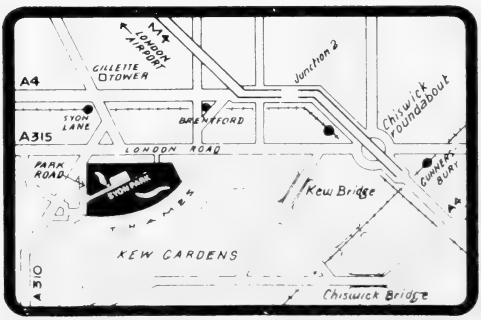

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AES BULLETIN

No. 339

A FEW THOUGHTS FROM THE REGISTRAR

The Society's membership is now about 1,700, at home and abroad, and the management of the Society's affairs has become a major task for its officers. All our officers are 'acting unpaid' and also out-of-pocket, if only the cost of attending six meetings of the Council in London during the year is taken into account. Your Registrar receives an honorarium but members should appreciate that the voluntary work undertaken on their behalf deserves the support and reciprocation of the membership. Prompt payment of subscriptions saves time, money and aggravation. Last year three hundred reminders had to be sent out to members who had not paid by May and at the end of the year there were still nearly eighty members who had not paid the full subscription through the banker's order system. When writing to officers, make sure you write to the correct one as listed on the inside cover of the Bulletin. If you change your address and do not notify me, your Bulletin, etc. will go to the old address. Always remember to quote your membership number - we have many members who have both the same name and initial. If you write for information or to a member of the advisory panel, please enclose a stamped addressed envelope. Postage has become a major burden on the Society's finances. We have a happy and thriving Society but it does depend on the co-operation of our members, co-operation which will lighten the burden which falls on the shoulders of your Council and its officers.

Nancy Cribb

DRAGON-FLIES

To-day I saw the dragon-fly
Come from the wells where he did lie.
A inner impulse rent the veil
Of his old husk: from head to tail
Came out clear plates of sapphire mail.
He dried his wings: like gauze they grew;
Thro' crofts and pastures wet with dew
A living flash of light he flew.

Alfred Tennyson

THE WILDLIFE AND COUNTRYSIDE ACT 1981: THE FIRST SITE PROTECTION ORDER IS MADE

An eyewitness account

When we first became interested in field entomology several years ago, we by chance found in the local W. H. Smith's a work which seemed to be a complete guide to the recorded sites of the species of lepidoptera occurring within our own Vice-County, and beyond. This was "The Butterflies and Moths of Hampshire and the Isle of Wight" by B. Goater. We wrote to Mr. Goater, and his reply recommended that we should take a look at a very productive area right on our own door-step, viz. Baddesley Common/Emer Bog. This, when we explored it, proved to be a true acidic grassland and bog, extending to almost 200 acres, quite distinct from the typical New Forest heaths and, until then, hidden away from us among grazed pastures. Productive indeed, for - we learned later - the bog alone was the site of 322 recorded species of lepidoptera, including the Lesser Cream Wave (*Scopula immutata*) and the Dotted Fan Foot (*Macrochila cribrumalis*) which are absent from the rest of Hampshire, including the New Forest; and Metcalf's Carpet (*Lamproptaris atregiata*) which in Hampshire is known only from the Bog and the New Forest. The Purple Emperor (*Apatura iris*) has colonised recently. To us, the value of the site was pointed up by encounters there in the field with local "micro" experts Col. Dougie Sterling and Dr. J. Langmaid.

Our visits were enlivened several times by brushes with the tenant farmer's son - who also happened to be a Sixth Former at our school! - and so we took the Colonel's advice and applied to the landowner (Chamberlayne Estates) for formal permission of entry. Our application was rejected because - said the landowner - the site was on the market to be sold; and at that point we contacted the Hampshire and Isle of Wight Naturalists Trust, of which we were members. Soon afterwards the estates were sold, en bloc, with vendor declining to split up the land for conservation or, for that matter, any other purpose.

Then, in the Spring of 1982, painted notice-boards mushroomed on field gates and buildings everywhere: the new owners were going to re-sell in separate lots by auction. We got in touch with our Parish Council (including a word from the "public gallery" at question time), and they came out as supporters of conservation on their own "patch" and themselves wrote to the Nature Conservancy Council who confirmed there was existing SSSI status. The Trust decided to attempt a purchase at the auction, and came away successfully as new owners of the 61-acre Bog, but at a cost greatly in excess of valuation: as to the extensive Common, the selling-price as farming development land went to around six-figures, way beyond the means of the average local conservation

body. By now, however, the NCC had made a prudent reappraisal of the SSSI's extent and had halved the classified area to exclude "improved or species-poor grassland" but still retaining the ecologically more valuable tracts.

Already as we write, the de-classified ground - an interesting and unusual habitat in itself - has been rendered a featureless plain by ploughing and grubbing-out.

But the compact area remaining outside Trust ownership was considered by the NCC to be important enough for them to seek the very first Site Protection Order under the new Act. This was to be the first test-case on the effectiveness of the legislation for the thousands of small SSSI's, as distinct from the 40 "super - SSSI's" whose protection (according to Dr. Lonsdale in the Bulletin, Vol. 41, p.127) appeared to be more complete.

On 23rd October 1982, the Hampshire and Isle of Wight Trust organised it first 'Open Day' for members to view its newly-acquired prize purchase, and to be told (by Dr. Bob Page, the Trust's Field Officer, who had played a major part in the acquisition) something of the hard task of "restoration" and practical management in which it is hoped they will play a practical role; beginning with 'rolling back' the invading *Salix* (Note for Purple Emperor "fans": there will still be plenty of *Salix* left for *A.iris*!). Some 50 members floundered gladly along tracks more than usually sub-aqua after heavy rains: but not till later that day did someone open his "Daily Telegraph" and read the welcome single-sentence report: "The first protection order under the 1981 flora and fauna at Baddesley Common, near Southampton, has been made by the Department of the Environment". The chapter is not yet closed for we are still within the time allowed for appeals procedure; but at least the delicate period of "run-up" to the signing of the Order had been successfully seen through, and those directly concerned tried not to read too much into the fact that the Secretary of State himself had deigned to authorize the Order for what is, after all, only a minor case in terms of acreage protected. And, for the NCC, there must be some cause for satisfaction on the way things have turned out so far.

At this stage the news must give a "lift" to those conservationists who will be fighting cases in future, often for bigger stakes and against substantially greater odds. If it helps, the lessons of Baddesley seem to be: when a threat becomes known, alert your Local Authority, County Trust and the NCC, and if possible get them working "on the same wavelength". It may also help that the site decided on for protection is compact so that the landowner/farmer does not feel his potential loss of income is "impossible"; and so that the limited funds set aside for management agreements to compensate for non-development are likely to be able to cope (NCC has made a first allocation of only £80,000 in the

current year for the whole country): this, even though it is not helpful to conservation to have the protected sites in isolated "penny-packets". And, finally, look to your Invertebrate Site Registers; it's no good producing them after the site has vanished!

All conservation is costly in money and effort; and for Baddesley Emer volunteers a good deal of labouring and indexing work lies ahead (entomologically speaking, there is the great untapped world of invertebrates outside the already recorded lepidoptera — and that is the direction in which we ourselves will be moving). As to finance, although in this case the £21,000 or so that it cost the Hampshire and IOW Trust to acquire its ground was partly met by generous gifts from the World Wildlife Fund, the Nature Conservancy Council and Hampshire County Council — which are hereby acknowledged — it still remains to recoup some £14,000 to meet further challenges, not an easy task in these times.

Duncan Reavey (6934J)
Simon Reavey (7421A)

THE INSECT FARMING AND TRADING AGENCY IN PAPUA NEW GUINEA

Ever since the days of pioneering collectors who brought back amazing new discoveries to wide-eyed collectors in Europe, the beauty and diversity of New Guinean insects and the great size of many of them, have been a constant attraction to entomologists worldwide. This huge demand led to the establishment, within the Wildlife Division, of the Insect Farming and Trading Agency in the latter half of 1978 as a means by which the government could both supply and yet carefully monitor the ever-increasing trade in insects of the region.

Apart from teaching Papua New Guineans merely to collect insects for sale to the IFTA, insect farming is being promoted so that species are both conserved and made commercially available in large quantities. Great success has already been achieved in farming the common Birdwing butterflies by planting out areas with large numbers of their specific *Aristolochia* vine foodplants. Research into the life histories of many other economic butterflies is well under way so that an increasing number of species will become available in perfect ex-pupa condition. Butterfly distributions are also being mapped on the well tried 10 km grid recording system, so that an assessment of their rarity or abundance can be made and conservation measures implemented where necessary.

A specific ecological study of *Ornithoptera alexandrae* was begun in early 1979. This, the world's largest butterfly, is protected by law because it is entirely restricted to the Northern Province of the PNG mainland. The habitat of the butterfly is threatened by the development of the oil palm industry and by logging but, happily, the project is

beginning to get areas set aside as reserves for the species. These areas are being planted out with the foodplant of the butterfly to replace the areas of natural habitat that have been lost.

With the advent of the IFTA landowners were pleasantly surprised to find that, instead of being advised that the only way to make money from their land was to cut down the rainforest on it to sell as timber, or to develop it by turning it into cocoa, coffee or oil palm plantations, they should in fact merely leave it intact. In this way they could not only crop the insects that rely on the woodland for their survival, but also retain their traditional hunting grounds. Most of PNG is still covered by primary rainforest and the careful exploitation of the economic aspects of its insects will not only be the ultimate safeguard of the rarest species but of the habitat in which they occur — the kind of habitat that is fast disappearing on a worldwide basis and about which scientists the world over are now seriously concerned.

The central marketing agency has a number of other important functions. It allows people to obtain fixed prices for their insects and maintains a strict quality control. Because the insects are pooled after sorting, the larger orders of dealers overseas can be supplied more easily. All specimens received are documented so that the 10 km records of butterflies, for example, are well augmented and not merely reliant on the work of the few field recorders in the country. Even insects sent in that may be too damaged for sale are, in this way, of value and all specimens of interest are set aside to be lodged in the national insect collection for further study.

The industry is extremely important to a developing country like PNG. The product can be thought of essentially as a high value — low volume/ weight crop. This is important because it means that it brings a much needed income to the people of the predominantly rural areas of the country, involving minimal airmail costs to the sender. It compares extremely favourably therefore, with the much larger effort required to grow and process coffee, for example. It is also a business which the people (after their initial surprise and amusement that people in other countries should want to pay for insects) quickly come to terms with — after all they have lived their lives in close contact with the beauty and diversity of their insects, and invariably know much about their intimate secrets.

M. J. Parsons

(Michael Parsons works for the Division of Wildlife in Papua New Guinea and for some years has been concerned in both the conservation of threatened species and with the setting up and running of the Insect Farming and Trading Agency — Editor.)

PLIGHT OF THE WORLD'S LARGEST BUTTERFLY

In Papua New Guinea there are six protected species of *Ornithoptera* viz: *alexandrae; paradisea; goliath; chimaera; victoriae; meridionalis; (allotei* is a hybrid).

Of these *O.alexandrae* is in most need of conservation, it is confined to small regions of virgin forest around Popandetta in the Northern Province. Most of the population exists in areas being logged or cleared for oil palms, at the time of writing. In all probability this species will disappear, unless there is a concerted effort from *outside* PNG in the next 1 - 2 years, although some progress in setting aside protected areas has already been made.

The other species are more widespread with *O.paradisea* probably the rarest species with only three or four main centres and low populations. It should be protected, but no real conservation effort is needed. *O.meridionalis* in similar. *O.victoriae* is localised and therefore habitat conservation is most important. *O.goliath* and *O.chimaera* are found at medium and high altitudes where there is still abundant forest and they are fairly widespread. It might be possible to farm the latter two in order to finance the conservation of *alexandrae,* as is already done with many other species. *(See previous article — Editor.)*

After March 1983, there will be no active research in this field in PNG. It is thought that the PNG Government will not take active steps to foster research, but the time is ripe for outside bodies to step in.

Obviously *O.alexandrae* must be given priority. The Northern Province (Oro) has *alexandrae* as its emblem. Money is scarce, but the loss of their emblem might motivate people into action.

The Company at present logging in the *alexandrae* haunts is thought to be sympathetic to conservation, though they themselves do not have sufficient funds to help with direct finance. They should be approached for help with transport, accommodation.

If the AES can work up enough feelings over the plight of these spectacular butterflies, perhaps get backing from the World Wild Life Fund, it seems quite likely that *alexandrae* might be saved. The obvious course would be to create a captive stock (perhaps), once the forest is cleared and planted with oil palm, *alexandrae's* foodplant can be planted among the rows of oil palms and around the edges and on to these, release the captive stock.

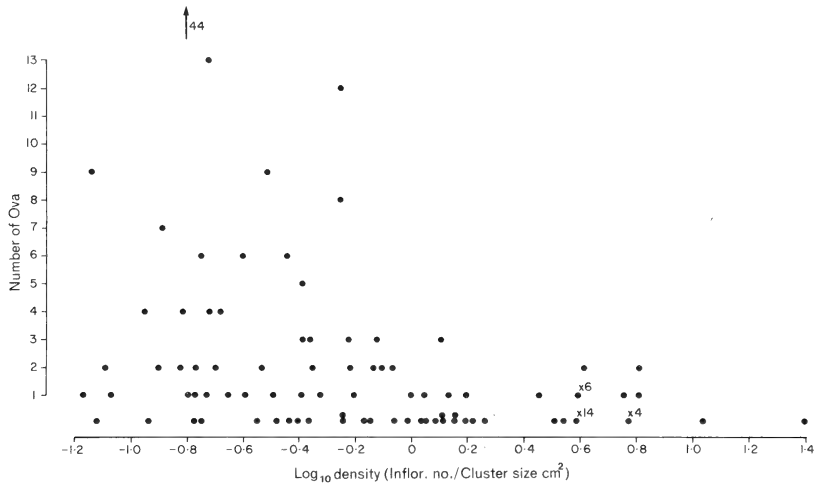
J. Cooter (3290)

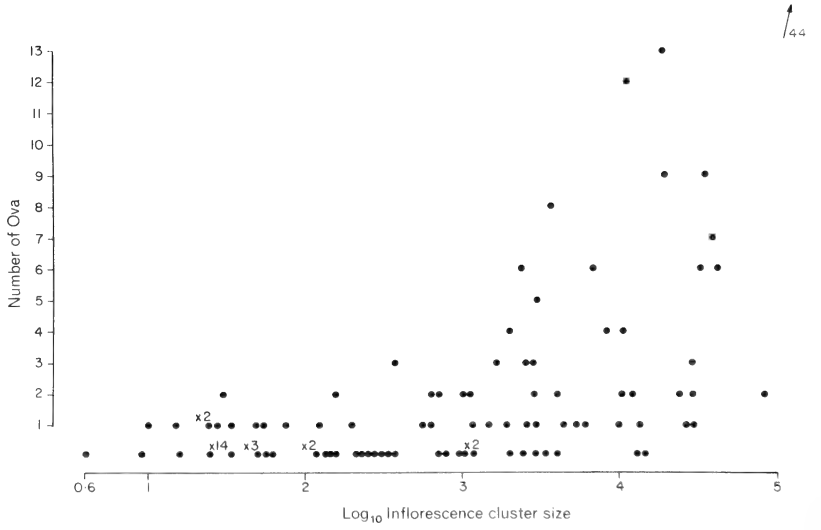
SPATIAL PATTERNING IN BUTTERFLY OVIPOSITION. DENSITY INFLUENCES AND THE 'EDGE EFFECT' IN THE ORANGE TIP BUTTERFLY (*ANTHOCHARIS CARDAMINES* (L.), LEP., PIERIDAE.

Introduction

A hierarchy in spatial responses and pattern characterises egg-laying in the Orange Tip butterfly (Dennis and Courtney, in press). Scales of response are distinctive and vary from choice of habitat to the ultimate location of ova on pedicels at floret level. Visual responses are dominant in the butterfly and it is clear that a number of significant cues, manifested in impact or 'size', exist within each habitat. Such are hostplant cluster dimensions, shoot, inflorescence and floret number, hostplant height and flowering status, representing a number of spatial scales. Several other strict adaptations have been identified (Wiklund and Ahrberg 1978, Courtney 1980), for instance the avoidance of shoots with potential competitors (including other Orange Tip eggs) and possibly predators, weak shoots and old plants in pod; also the strict, though not invariant, choice of the pedicel of the floret as the final destination for ova. Both responses to size components and avoidance behaviour contain easily interpreted chains of selection pressures, advantages accrued in the number of eggs being laid and surviving respectively. Avoidance of shoots in pod has much to do with the size of a butterfly's visual response to flowerheads of varying developmental status and indirectly with the mechanical difficulties the larvae have in tackling older plants (Courtney 1980). The pedicel provides a firm anchor for the duration of the egg stage not provided by the sepals or petals.

A. cardamines has also been found to have a 'bias' for the margins of hostplant clusters (Courtney 1980; Wiklund and Ahrberg 1978). This bias, given the term 'edge effects' has now been recognised to occur at several scales, namely of the habitat, clusters within the habitat and on patches within clusters. It is also known from other butterflies (Kobayashi 1957; Edmunds 1976; Ashby 1974; Cromartie 1975; Jones 1977; Shapiro 1975). A question arises from these observations and that is — is the butterfly responding to edges for their own part or to some function of plant density? Density is an awkward concept since it depends on the scale of observations and the location of boundaries, but then these two criteria cannot be ignored when referring to edges. In fact, both evoke the difficulty of applying break points or boundaries to items measured on continuous scales as opposed to those distributed discretely. This short paper looks at one or two measurement issues relevant to this problem in the Orange Tip butterfly.


44
Number of Ova
x6
x14
x4
Log10 density (Inflor. no./Cluster size cm2)


44
Number of Ova
x2
x14
x3
x2
x2
Log10 Inflorescence cluster size

Methods

The study has been carried out at two sites in the Bollin valley in north Cheshire, at Warburton Green and at the Carrs, Wilmslow, some 5.5 km apart. The sites are compact, some 120m × 60m and 150m × 200m in dimensions respectively. *Cardamine pratensis* (L.) is the only crucifer present at Warburton Green, but three hostplants occur at the Carrs, namely *C. pratensis, C. amara* (L.) and *Alliaria petiolata* (Bieb.).

At both sites assessment of density has been carried out by measuring the dimensions of hostplant clusters (length × breadth), the number of inflorescences and the number of ova and larvae. Edge effects have been identified at Warburton Green using mapping techniques, both compass mapping of the entire habitat and more detailed quadrat mapping of one large cluster. Details of the techniques and the corresponding maps are available in Dennis and Courtney (in press). Within the Warburton Green site, 102 hostplant clusters were examined, comprising 4976 inflorescences and 275 eggs and larvae. The full rectangle of the hostplant cluster mapped using quadrats occupied 999, 50cm^2 or 24,975, 10cm^2 divisions including 3108 infloresences and 66 *A. cardamines*. From the Carrs, data for 92 hostplant clusters and 155 inflorescences were obtained, showing 108 eggs and larvae present.

Apart from illustrations of the distribution of eggs at three scales, the non-randomness of oviposition was disclosed by numerical techniques, by comparison with a Poisson distribution, in the calculation of variance/mean ratios (Kershaw 1964) and the determination of fringe and edge indices (Dennis and Courtney, in press). The latter measure the distribution of eggs in respect of the hostplant cluster centre and periphery. Both have values potentially ranging from 0 to 1 for edge- (fringe-) biased and centre-biased distributions respectively, 0.5 implicating a distribution equidistant between the two. The fringe index is the less stringent of the two; measurement is made to the epidermis of the entire distribution represented by the lowest isopleth of the hostplant (unity), whereas the edge index is measured to the nearest empty space within or at the margin of the distribution.

Results

Distinctive edge effects have been disclosed at three different scales, namely that of the habitat, clusters within the habitat and patches within clusters (Dennis and Courtney, in press). For the hostplant cluster at Warburton Green, mapped using quadrats, the mean fringe coefficient ($x = 0.191$; $= 0.177$) and edge coefficient ($x = 0.083$; $= 0.081$) manifestly demonstrate bias towards the periphery. Moreover, the variances are exceptionally low. At the same time an obvious negative relationship between number of ova and inflorescence density has been

disclosed for the Warburton Green site (Figure 1). However, regardless of the significance level, the correlation is poor ($r_{s\,(105)} = -0.44$, p 0.001) with less than 20% of the variance in egg-laying being accounted for by density effects. The figure is likely to be much less than this as there is close interaction between several factors and the periphery of the Warburton Green site has topographic advantages, for instance of aspect, as well as other mechanical advantages discussed below. More noticeable is the enormous variance in oviposition with low densities implicating other factors in oviposition. Interpretation of this is facilitated by data for cluster size (Figure 2) and inflorescence number, both of which provide high correlations with number of ova ($r_{s\,(105)} = 0.7$; p 0.001 and $r_{s\,(105)} = 0.625$; p 0.001 respectively) and both of which reveal the similar excessive widening of variance.

The range of oviposition values for the Carrs hostplant clusters is too low and the variance too wide for the same negative pattern to emerge effectively. In any case, this tendency only exists for *C. pratensis* ($r_{s\,(29)} = -0.44$; p 0.05); the distribution on the scattergram for *A. petiolata* approaches a random array ($r_{s\,(27)} = -0.14$; p 0.1) and for *C. amara* is distinctly positive ($r_{s\,(36)} = 0.19$; p −0.1). Quadrat mapping for the one hostplant cluster at Warburton Green (Zone R) also produced positive relationships between oviposition frequency and flower density, and at the two different scales of $50cm^2$ and $1.5m^2$ units (Table 1). Categorization into three classes became necessary again because of low egg frequency but also because of declining sample size with increasing inflorescence values.

	Inflorescence density per quadrat		
Size of quadrat units	1 to 10	11 to 20	Over 21
50 cm^2 units	0.133 (n = 284)	0.217 (n = 69)	0.312 (n = 28)
1.5 m^2 units	0.476 (n = 21)	0.930 (n = 15)	0.913 (n = 46)

Table 1 Mean number of eggs and larvae for three density classes measured within $50cm^2$ and $1.5m^2$ units at the Warburton Green site.

The figures show that high oviposition frequencies are associated with increased density confirming no more than the expected relationship that as a resource increases so does the utilization of that resource.

Discussion

A clear bias in the female butterflies for hostplant edges at different scales has been demonstrated (Dennis and Courtney, in press). However the results relating oviposition to density are contradictory and association with higher as opposed to lower density zones has been noted in two cases. The inverse correlation for the Warburton Green site as a whole probably has much to do with the co-variation of cluster size, flower number and the

density measure abstracted from them. It is effectively cluster size that is being measured and the inverse correlation is in all likelihood an artefact of the density measure. When density is measured by taking the length and breadth of a cluster, as the number of shoots or flower heads increases so do the dimension of empty spaces between them, exponentially. The correlation with cluster size is also much higher ($r_s = 0.7$) and thus what, with a quadrat technique, would be the most dense areas, also attracts greatest egg-laying. As it is, the quadrat study of the single cluster (Zone R) at Warburton Green also demonstrates a positive as opposed to a negative relationship. High density, not low density, zones attract oviposition and density is a size component as much as are cluster size, flowerhead number, shoot size and floret dimensions. Similar responses to plant size have been recorded in other butterflies, for instance in *Pieris rapae* (L.) (cf., Ives 1978).

Any inverse relationship between egg-laying and density is likely to be due to the morphology of the habitat but can equally be the outcome of measurement techniques of 'area' in density studies which artificially impose arbitrary boundaries around clusters. One habitat influence occurs frequently. Peripheral clusters are usually small and set well apart from each other and from centrally placed clusters. Orange Tip females are probably physiologically more responsive to hostplant clusters and less selective about hostplant criteria as the time between egg-laying episodes (distance between hostplant clusters) increases, and thus in passing over such a habitat are likely to lay relatively more eggs on the smaller well-dispersed clusters.

Edge effects may have much of their explanation in conflicting selection pressures. Response to size components in the habitat probably results from the need to release eggs rapidly in poor weather conditions, for instance after periods of cloud. Such a period was experienced in 1981 when no eggs were laid at either of the Bollin sites because of adverse weather between April 18 and May 8. Courtney (1980) has discovered that in some Durham colonies only about 10% of the potential egg load is laid and there is thus a premium, in these circumstances, on releasing eggs rapidly. Females are attracted to high density zones in the same way they are to large clusters or large shoots. However, it is also clear that females do not lay all their eggs on one plant or cluster. Some adaptive feedback responses alluded to in this respect are the avoidance of competition, amongst themselves as well as other crucifer herbivores, and predation. As has been mentioned, adaptive responses are well developed and apparently extend to the extension of shoot age criteria and the final oviposition site. It is also well known that multiple oviposition on shoots leads to cannibalism in this butterfly (Ford 1945). Thus response to a crucifer patch is encouraged by size or density but this response is limited to perhaps a single oviposition per cluster per visit. Whether or not there is a response to the density environment that limits

the number of ovipositions per visit can only be ascertained by following the behaviour of the butterflies.

'Edge effects' may therefore be considered as a mechanism describing the butterfly's response to clusters as opposed to plants or inflorescences. Since edges occur at different scales, a mechanism is also required to explain the recognition of edges as opposed to centres of hostplant distributions. Physiological delay between egg-laying episodes is insufficient as a factor. It is possible that some visually received binary trigger or cue is responsible, such that the butterfly has to react to a non-plant trigger before it again responds to another plant cluster. Ultra-violet reflectance from the hostplants could play an important part in this behaviour (Kolb 1975). Unfortunately, if this or a similar process described a feasible mechanism, it would not in itself discriminate between edge effects and density influences as other parameters of plant density would be likely to control the level of response to binary triggers.

Acknowledgements

Thanks are due to the following members of the Manchester Grammar School (NHS) for their assistance during the fieldwork: C. J. Smith, M. A. Shippey, S. D. Thompson, D. J. Bee and M. J. Bramley. Thanks also go to Art Shapiro and Steven Courtney for comments on the text.

Roger Dennis (5851)

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(Roger Dennis has asked us to point out that he has moved from Durham and his address is now 4 Fairfax Drive, Wilmslow, Cheshire. — Editor.)

LEPIDOPTEROUS FOOD-PLANTS

Brian Wurzell, in his paper 'Tender Taste and Tough Terrain' (1981, *Bull Amat. Ent. Soc.*, 40:198-200), raises a number of interesting points, without, to my mind, providing very convincing replies. I emphatically disagree with his hypothesis that larvae are often trained in the wild to accept a selection of botanically very contrasting trees, which may have only their similar size, growth form and co-existence in common. Isn't it far more probable that plants sharing a common environment contain similar chemical elements in their tissues, seeing that they are drawing their nutrients from the same source?

I would suggest that there are three factors essential to an insect/food-plant relationship. The plant must:-

1. Contain an attractive substance for the laying female.
2. Not contain a repellent element, either chemical or physical.
3. Contain an element or elements essential for the insect's metabolism.

I can cite two examples to illustrate this.

I was misled for several years by an observation by Dr. Van Someren that he had seen females of *Charaxes lasti* Gr.Sm. ovipositing on *Afzelia quanzensis* (Caesalpiniaceae), and confined many female *lasti* with sprays of *quanzensis*. They laid freely but the larvae did not feed well and all died before reaching their second instar. It was only when I found an ovum in the wild on *Julbernardia magnistipulata* that I was able to rear the species and describe and photograph the previously unknown early stages. A similar situation exists with *Charaxes brutus* Cr. Wild females lay freely on *Melia azedarach* (Meliaceae) but again the young larvae do not thrive, and die without moulting. Oddly enough, half-grown larvae removed from other food-plants will complete their metamorphosis successfully on *azedarach*. Presumably in these two instances, the food-plants fail to meet condition 3.

Taxonomists do not appear to attach a great deal of importance to food-plants, probably due to the scanty information on the subject. I am sure, however, that when more is known, and when we know more about plant chemistry, there will be a number of taxonomic changes. I can cite two recent examples of this. Some years ago I was given an unknown sphingid larva feeding on *Impatiens* (Balsaminaceae). When the imago emerged it proved to be what was then known as *Temnora aureata* Karsch; as the larva was more Choerocampine in appearance than Philampeline, and as *Impatiens* is a typical Choerocampine food-plant and not recorded for any *Temnora*, I urged my friend Dr. R. H. Carcasson, who was then preparing his *Revised Catalogue of the African Sphingidae,* to make a careful examination of the species, with the result that *aureata* was transferred to *Basiothia*. Again I have always been

worried by the fact that *Charaxes etesipe* Godt. was reputed to be so sensitive over its food-plant that it would only eat the green-stemmed variety of *Ricinus communis* (Euphorbiaceae) and refused the red-stemmed, although botanists could find no difference between the two, and yet its reputed subspecies *tavetensis* Roths. was recorded as feeding on a number of Caesalpiniaceae and other plants. It seemed quite impossible that one subspecies should be so selective and another so catholic. I have recently learned that Dr. Van Son has separated the two as good species (*Butterflies of Southern Africa,* Part IV).

I have never been really happy over the amalgamation of the ultra-polyphagous *Prodenia* and the predominantly grass-eating *Spodoptera.* I have records for the African *littoralis* Bsd. of 29 genera spread over 20 families of plants and for the Asiatic *litura* F. of 74 genera spread over 48 families, including dicotyledons and monocotyledons, grasses, herbs, shrubs and trees, including Coniferae. Apart from the differences in food-plants, both larvae and imagines of the two groups are easily separated: The 'lumpers' have certainly won in this instance.

Many groups of food-plants and the insects feeding on them can be linked by the chemical constitution of the plants. Most Pierine and Teracoline food-plants can be linked by the presence of mustard-oil glucosides, viz. Cruciferae and Capparidaceae, whilst the food-plants of *Utetheisa, Argina* and *Amphicalla,* viz. *Heliotropium* (Boraginaceae) and *Crotalaria* (Papilionaceae) contain pyrrolizidine alkaloids, a precursor of their sex pheromones.

A puzzling pair is the Sphingid genus *Nephele* and the Danaidae, these have a parallel range of food-plants, viz. Asclepiadaceae, Apocynaceae and Moraceae, all containing cardenolides, but whilst the Danaids retain these as part of the defensive armament, they appear to be eliminated by the Sphingids, which are not known to be distasteful. There is, of course, an alternative theory; the link is something other than the cardenolides and, whilst the Danaids select species with a maximum cardenolide content, the Sphingids choose those with a minimum. It is known that the West African form of *Danaus chrysippus* L. — *alcippus* Cr. — is less toxic than the others and that its local food-plant has a low cardenolide content.

The closely allied genera, the Asiatic *Delias* and the African *Mylothris,* all feed on *Loranthus* (Loranthaceae), but *M. chloris* F. has an alternative food-plant in *Osyris* (Santalaceae) and *M. berenice* Hew. is anomalous in feeding on *Polygonum barbatum* (Polygonaceae) and not on *Loranthus* at all. It would not seem unreasonable to expect that larvae feeding on *Loranthus* would also feed on the *Loranthus'* host but I know of no instances of this. There are, however, several instances where

larvae feeding on the host have been wrongly recorded as feeding on the parasite and *vice-versa*. The Lycaenid tribe Iolaini also feed on *Loranthus*.

What is the repellant that results in only the Indian Lycaenid *Chilades laius* Cr., apart from the genus *Papilio,* feeding on *Citrus* spp. (Rutaceae), and does *laius* also feed on the other Rutaceae acceptable to *Papilio*?

As Mr. Wurzell remarks, moths have already bridged the gap between the more advanced and primitive plants, but there are, as a matter of fact, two American Pierids — *Neophasia terlooti* Behr. and *N. menapia* Feld., that feed on Coniferae and a large section of the African Lyacenidae — Lipteninae — feed on Lichens. Erlich & Raven's *Butterflies and Plants — A Study in Co-evolution* would have provided a much less tidy picture if moths had been included; Mr. Wurzell does not seem to have read this.

Incidentally, I have read that *Ornithoptera* sp. are not all generalised feeders on *Aristolochia* but many are strictly specific. Seeing the trouble that is being taken to preserve *Ornithoptera* spp. in their native haunts, I find Mr. Wurzell's remark 'We can but experiment — we have nothing to lose but our caterpillars.' most unnecessary.

One last item to end this somewhat disjointed and rambling paper. The African Sphingid, *Coelonia mauritii* Btlr., has a very large range of food-plants belonging to the Acanthaceae, Ampelidaceae, Bignoniaceae, Boraginaceae, Compositae, Convolvulaceae, Labiatae, Loganiaceae, Oleaceae, Scrophulariaceae, Solanaceae and Verbenaceae, mostly trees and shrubs. Quite recently, on two separate occasions, a keen horticultural friend has brought me larvae which he had found feeding on *Aeschynanthus marmoratus* (Gesneriaceae), a pendant herb, native of Thailand. The choice of the female must have been deliberate as the plant is growing in a hanging basket suspended from the roof of an open-sided orchid house, and is probably the only one of its species growing in Mombasa, if not Kenya. Apart from anything else, this is the only record I have of any lepidopterous larva feeding on Gesnariaceae and it seems strange that the female should select *Aeschynanthus* when the orchid house is surrounded by *Millingtonia hortensis* (Bignoniaceae) the most usual Mombasa food-plant. Gesneriaceae includes the popular pot-plants *Saintpaulia, Episcia, Achimenes, Gloxinia* and *Streptocarpus,* which are grown in open verandahs in East Africa.

D. G. Sevastopulo (5526)

OF FOODPLANTS AND HAWKMOTHS

When one talks of herbivors what immediately springs to mind are gazelle, cattle, deer, elephants and such like, however, by far and away the most important terrestrial plant eaters are insects. They have evolved a remarkably diverse variety of mouthparts to deal with their food material, eating leaves from the outside and inside, boring through stems and roots and devouring flowers, seeds and fruit. Considering the abundance, variety and appetites of insects there must be various reasons why plants still manage to flourish on earth.

One is the production of defence structures such as spines, thorns and spiky leaves. Once these are removed many insects, or their larvae, will devour the resulting defenseless plant even though they would not normally eat it. Another is nutritional deficiency. However, these mechanisms take second place to the plant world's main line of defence.

Plants produce a wide range of secondary chemical compounds in vulnerable parts, which appear to perform no physiological function in the plants themselves, but act as potent repellents or even toxins to insects. Most widely known is a chrysanthemum extract, pyrethrin, a potent insecticide which is relatively harmless to mammals.

One very large group are the terpenes, or essential oils, simple aromatic carbon compounds formed by linking one isoprene unit to another to form a ring structure, or monoterpene: many of these joined together produce carotenoids and steroids. Most plants contain one or more terpenes which gives them their characteristic smell when crushed, e.g. menthol, citrol, camphor.

Alkaloids are just as important as terpenes, but due to their heterogenous structure defy ready description, being best described as 'usually heterocyclic carbon compounds containing a nitrogen atom'. They abound in certain plant families such as the Solanaceae and tend to be more widespread in tropical regions, examples being nicotine, strychnine, caffeine, solanin, quinine, marijuana and opium.

Whereas alkaloids and terpenes are derived from carbohydrates, another important group, the acetogenins, have variable origins amongst the fatty acids, carbohydrates etc., and include amongst their number rotenone (Derris) and the furocoumarins. The latter are well represented in the orange (Rutaceae) and carrot (Umbelliferae) families, their action on ingestion being to inhibit DNA synthesis in the skin under ultra-violet (UV) light. For this reason there are few small umbelliferous macrophages which are not either black or leaf-miners.

Of course, the Umbelliferae are also well endowed with certain types of another group of secondary chemicals, glycocids, the active ingredient of Hemlock *(Conium maculatum)* being most well known. Chemically they consist of a sugar portion bonded to a non sugar portion which can

be readily split by the mediation of plant or insect enzymes. This is when the non sugar portion exerts its toxic potential, action being related to chemical structure, hence, the classification into flavonoid, cardiac, phenolic, anthraquinone and thiocyanate (mustard) glycosides. Anthraquinones occur in fairly small number of plant families, for example, the Rhamnaceae, Polygonaceae and Rubiaceae and have the dubious distinction of being widely used human laxatives.

Thiocyanate glycosides are distinguished by the presence of sulphur in their structure and are responsible for the characteristic smell of crushed Cruciferae, Tropaeolaceae and Resedaceae leaves. Two examples are sinigrin, found in *Brassica* species, and glucotropaeolin, present in *Tropaeolum majus*.

Related to glycocides are the saponins which, together with tannins, raphides (crystals of calcium oxalate), organic acids, bitter principals, etc., are used to protect plants from the attentions of insects.

Prevention of insect attack is not a simple physical process, but can involve various stages and behavioural effects. Gravid female moths intent on depositing eggs will generally occur in a region where suitable foodplants are present due to species habitat preferences, i.e. they grew up in that area. Here they home in on likely localities using as yet unidentified stimuli, probably a mixture of chemical, microclimatic and visual. At close range, however, individual foodplants are located by their silhouette or chemical 'signature', a characteristic mixture of volatile hydrocarbons and other secondary chemicals given off by that plant's metabolism, often the very same meant to deter insect attack. Before ovipositing the moth may double-check a foodplant's identity via tarsal receptors so as to reduce mistakes, for some completely unrelated plants appear to have very similar signatures. Of course, if the latter are not correct no eggs are deposited and that plant, be it an individual or species, will escape the attentions of that particular insect.

Although it is up to the female moth to select the correct foodplant, selection is dependent on what the larva can eat. Few herbivors (including lepidopteran larvae) have evolved the range of morphological and physiological adaptations allowing them to feed on all plants; most specialise to some degree. Caterpillars employ alimentary mixed function oxidase enzymes to detoxify secondary plant compounds; the more polyphagous a species the more oxidase enzymes it will generally possess in terms of types and quantities.

The above implies a larval ability to distinguish between edible and inedible plants. Caterpillars bear a range of gustatory sensilla on their maxilla which respond to the range of secondary and other compounds found in plant tissue. In simplistic terms if, during feeding, more positive stimuli are received than negative (all plants contain both beneficial and

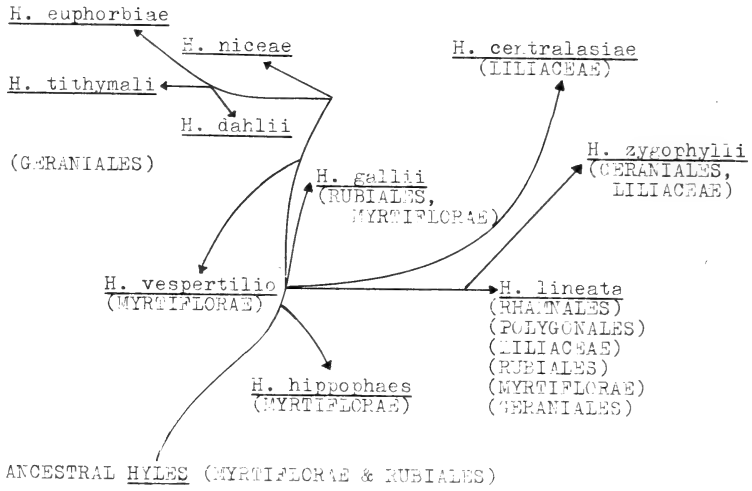

Fig. 1 Foodplant relationships between the Macroglossinae.

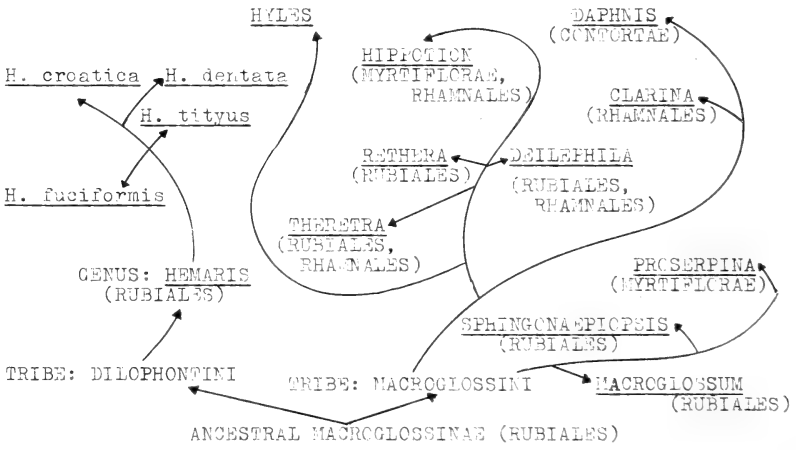

Fig. 2 Foodplant relationships between the various members of the genus Hyles (=Celerio).

harmful substances in varying proportions) the plant is edible and feeding commences and/or continues. As it is in the insect's interest to have positive stimuli supplied by secondary compounds it is capable of detoxyfying, they become feeding or even oviposition stimulants for that species.

Thus, on the one side there are the plants producing a range of chemical compounds which vary between species, genera and families, both in proportion and type, to protect themselves from earth's most important terrestrial herbivors, the insects. The latter, in order to feed, have found it necessary to evolve mechanisms to neutralise the above, but most have been unable to breach the chemical defences of every plant group and have become specialised, relying on stimuli produced by once toxic compounds to identify suitable foodplants.

The above situation, however, is not static but in a constant state of evolutionary flux for, to avoid being fed upon, a mutant plant which can produce a new deterrent will prosper at the expense of its fellows with no deterrent. But, as the plant population builds up a deterrent factor, pressure is put on the original insect population to adapt to this deterrent. Some will be able to respond, some may change to foodplants containing deterrents similar to the original foodplant. Thus, for those insects which crack the new deterrent code competition will be reduced. Hence the theory of insect/plant co-evolution.

With regard to lepidopteran foodplants, most work concerns itself with butterflies, but in order to understand the present day pabulum of Europe's hawkmoths it is beneficial to look at the *machaon* complex of swallowtails and the Pierine genus *Artogeia*.

Papilio machaon is the world's most widely distributed swallowtail, ranging across Europe, North Africa, northern Asia and northern North America. In central and southern North America it is replaced by closely related species — *indra, rudkini, polyxenes, brevicauda, bairdii, zelicaon, joanae and oregonius,* while in Europe there are two other related species — *hospiton* and *alexanor*. All can feed in the larval stage on the unrelated Rutaceae and Umbelliferae. Why this should be so becomes immediately apparent when one looks at the plants' chemistry. Rutaceae contain furocoumarins, small amounts of tannin, a bitter principal, the glycoside rutin and the monoterpenes methyl chavicol, anethole and anisic aldehyde. Although rutin may be absent, all the above also occur in the Umbelliferae. Differences in wild foodplants appear to be mainly due to adult oviposition behaviour for, although *machaon* and *polyxenes* will not oviposit on Compositae containing the same or similar secondary compounds, their larvae can be reared on *Solidago* and *Cosmos*. Two members of the complex, however, have overcome the as yet unidentified oviposition deterrent and adopted *Artemisia dracunculus* as their natural foodplant, these being *P. bairdii* and *P. oregonius*.

The situation with *Artogeia* is much simpler; thiocynate glycosides act as both adult oviposition and larval feeding stimuli and so *A. rapae* can be found feeding in Europe on the unrelated Cruciaferae, Tropaeolaceae, Resedaceae and Capparadaceae. Of course, preferences are shown within these families for species containing the least amount, or types, of other secondary chemicals which *A. rapae* cannot effectively neutralise.

Hawkmoths show similar 'preferences' in their selection of foodplants. As important as evolutionary relationships between plant species are the chemical. Indeed, the ability to detoxify only certain secondary compounds is so characteristic of most Sphingid subfamilies and tribes that one could almost classify them according to these abilities.

With regard to the European Macroglossinae, out of eleven genera, nine take members of plant order Rubiales (Rubiaceae, Caprifoliaceae, Valerianaceae and Dipsacaceae) as major or minor foodplants. Further studies may show that even the two exceptions, *Clarina* and *Daphnis*, can also feed on these plants. The whole subfamily is basically restricted to six plant orders between them, Rubiales, Contortae, Myrtiflorae, Rhamnales, Geraniales and Polygonales. Because of an almost universal acceptance of the Rubiales as foodplants, it is probably Macroglossinae whose evolution proceeded as outlined in Fig. 1. Each switch of a species/genus/group to a new diet could have been the result of:-

1) A mutant strain arising in one species allowing it to exploit a totally new, little utilised foodplant order/family/genus and so avoid competition, or expand its range.

2) An isolated population of a polyphytophagous species specialising in only one or two foodplants so as to beat possibly fierce competition for a limited resource.

An oligo or monophagous species could be the result of factor (1) above, resulting in a new species with time, or an old, dying species whose foodplants have become resistant to it.

Taking the genus *Hyles* on its own:-

Thus, the order Rubiales, Myrtiflorae, Geraniales and Rhamnales must contain similar secondary compounds to allow the Macroglossinae to switch amongst them, or to specialise on one particular family in an order. The families of these orders are listed below for ready reference.

RUBIALES
- Rubiaceae
- Caprifoliaceae
- Valerianaceae
- Dipsacaceae

MYRTIFLORAE
- Thymelaeaceae
- Elaeagnaceae
- Lythraceae
- Onagraceae

RHAMNALES
- Vitidaceae
- Rhamnaceae

GERANIALES
- Zygophyllaceae
- Euphorbiaceae

A. R. Pittaway (4802)

NOVEMBER BUTTERFLIES IN MADEIRA

On a short package holiday to Madeira in early November 1982 I was pleased to see butterflies still quite plentiful, although of rather few species. However, these species were particularly interesting as they included some of the rarer migrants to Britain and gave me an opportunity to see and photograph them.

I was surprised to find the Monarch (*Danaus plexippus*) fairly common; I saw it in three localities. Higgins and Riley (1980) note its occurrence in the Canary Islands since 1880 but do not record it for Madeira, but I saw a short article in an English-language newssheet which said the Monarch had established itself there the previous year, 1981.

The Long-tailed Blue (*Lampides boeticus*) was common; it is apparently the only blue there. The upper side was not very different from that of a Common Blue, but the underside markings were more like those of Hairstreaks. Clouded Yellows (*Colias crocea*) were common, and the most abundant species was the Painted Lady (*Vanessa cardui*); I did not see any thistles for them, only some yellow sow thistles. Large Whites (*Pieris brassicae*) and Small Whites (*Artogeia rapae*) were also found; the latter has only been known there since 1974, but is now common.

I saw two specimens of the Indian Red Admiral (*Vanessa indica*) which is unknown in any other locality between the Canary Islands and India. Apart from the obvious difference in the red markings this butterfly seems to hold its wings at a slightly different angle when spread out sunbathing, and is thus easily distinguished from *V. atalanta*. The Madeira Speckled Wood (*Parage xiphia*) was the second most abundant species at that time of the year. It seemed rather brighter in colour than the European species and my photographs of three specimens all show a greater area of the lighter orange markings than in the illustration by Higgins and Riley.

A. G. Gaydon (3198)

REFERENCE

Higgins, L. G. and Riley, N. D., (1980). *A field guide to the butterflies of Britain and Europe*. Collins, London.

BOOK REVIEWS

Advances in Insect Physiology Vol. 16. 368pp numerous figs. Boards. Academic Press, London 1982. Price £29.80

As is usual with this series, the presentation is of a high standard and the articles provide an informative, up to date coverage of a particular topic, supported by an extensive bibliography. The coverage in this volume is as follows: Microclimate and the Environmental Physiology of Insects; Control of Food Intake: Biology of Eye Pigmentation in Insects: The Physiology of Caste Development in Social Insects and Chemoreception: the Significance of Receptor Numbers. As can be seen from the titles, this is not a book for the beginner, but anyone with a reasonable background and an interest in the topic would benefit from borrowing this book from a library.

Paul Sokoloff

Garden Wildlife. Introduction by Derek Jones, text by nine separate authors, with illustrations by Phil Weare. Published by Ebury Press, price £7.95.

Looking at birds and insects in the garden has long been a popular past-time and the cost of travel today means that much wildlife observation is likely to be done at home. The beautiful illustrations in this book are a definite compensation and are quite as good as any available today. The text covers the full range of wildlife which can be found in gardens, arguing that the horticulturalist should also be a naturalist, with conservation not far behind. Gardens can become an important refuge for wildlife as the countryside becomes less diverse and cities spread, and many will have a greater value in the future than we realise. There is evidence that changes in bird behaviour are occurring; siskins now eat peanuts and reed buntings come to bird tables in winter. In the New World the American blackbird, substantially reduced in numbers because of the removal of old tree stumps, now owes its survival to the presence of thousands of nest-boxes. The book shows that gardens have a major role as wild places disappear.

Habitat

NOTES AND OBSERVATIONS

Some butterflies observed — Whilst on holiday in Holywell Bay near Newquay in 1981 we caught and saw many Dark Green fritillaries *Argynnis aglaia* with no woodland in sight. Many of these were of a very dark form. Also at a nearby heathland was a variable colony of the Grayling, *Hipparchia semele.*

During the summer of 1982 I have seen an unusual number of Speckled Woods, *Pararge aegeria*, even allowing for the good year generally for butterflies. My parents were visited by two which fed repeatedly on some fallen victoria plums. The nearest woods being a mile or so away. — R. A. Wright (6598)

A migrant Clouded yellow in Sussex — I would like to report the capture of a near perfect male Clouded Yellow (*Colias croceus*) on the 25th July last year on the South Downs, to the west of Eastbourne, about a mile from Beach Head. This was at approximately 9.30 am on a fine clear day with a slight onshore breeze blowing. No other specimens were seen. — P. Schofield (6075)

An unusual brood of Small tortoiseshells — During the spring of 1982 I collected a few webs of the Small tortoiseshell, (*Aglais urticae*) as is my wont. I reared them through, releasing most but mating some for a second generation. When this second generation began to emerge I found them to be aberrant. Around 25% of them were emerging with yellow wings and, more importantly, yellow eyes. This yellow form appears weak however as many failed to emerge completely or were crippled and, of those that successfully emerged, all died within three days. I am attempting to over-winter some of their siblings in the hope of continuing the line. It appears to be a simple recessive character and so stands a good chance (67%) of being in the sibling as a heterozygote. — R. A. Wright (6598)

Convolvulous hawkmoth in Sussex — On the 23rd of August 1982 a friend brought me in a Convolvulous Hawk, (*Herse convolvuli*) which he found in his garden at Deaks Lane, Anstye. — Tim Newnham (4597)

Stag beetle in Essex — On the 18th September of last year a male Stag beetle (*Lucanus cervus*) was given to me. The beetle had been picked-up from the floor of a garage in Ilford, Essex, not many miles from Epping Forest. — R. S. Ferry (207)

A note on the Jersey Tiger moth — I was interested to read Mr P. W. Cribb's reference in the November 1982 Bulletin to the "Valley of Butterflies" legend in Rhodes.

I visited the valley in the summer of 1971. The guide blew a whistle and immediately hundreds of Tiger moths which were resting on the trees took flight and after a few minutes re-settled. The guide again blew his whistle with a similar result. I had not been partaking of the local ouzo!!

— R. S. Ferry (207)

A note on degreasing — I recently degreased an already infected specimen of *Laothe populi*. I used a method that involved laying the infected specimen on a layer of Fullers Earth (obtainable from most local chemists, though expensive), and then sprinkling the wings with a fine amount of the product. This was left for about two weeks and then taken out of the dry box and the dust gently blown off. Alas the dust did not all blow off, and I was left with a tatty looking specimen that had slightly wet, small, clods of Fullers Earth on the wings and body. To remove any coagulated lumps of fullers, might I suggest the following:-

"On to the end of a setting needle place some blu-tack and comb the hairs of the body downwards so as not to ruffle the hairs." This can also be done on the wings of fairly sturdy specimens (Noctuidae, Arctiidae, Notodontidae and Sphingidae for example). — P. A. Gross (7430)

Making data labels photographically — If you do not wish to have data labels printed, then the following is as good an alternative. I use a Rotring pen, 0.1 or 0.3, with black ink. With such a fine nib, ample information can be fitted on a piece of paper.

The best type of paper to use is one that does not have too fibrous a surface and is not glossy. A rather cheap (in the long-run) but effective method is to use a black and white photographic paper. This can be obtained from many shops and a choice of finishes is offered. For writing on, a satin or matt lustre is the best, being firm yet absorbent to the pen ink unlike gloss.

Initially as already mentioned, the cost appears rather high but when cut to the correct size it is realized that 1 box contains enough paper for a long, long time. — P.A. Gross (7430)

A new book dealer — We welcome to our ranks a new dealer in antiquarian and second-hand books who is specialising in those on butterflies. His first catalogue contained a selection of both very recent (but already out of print) and older fine items from the last century. He is David Dunbar, 31 Llanvanor Road, London N.W.2 and we understand his next catalogue is due out at about the same time as this issue of the Bulletin. — Editor

Somerset Level Saved; Farmers Fury — As reported elsewhere in this issue the first protection order under a new Act was made on Baddesley Common. As we were going to press the media announced that a similar order had been made for some of the threatened Somerset Levels. As reported on the Television News this resulted in a body of Farmers (not all of whom can have been affected by the order) burning three Conservationists in effigy. They should stop biting the hand that feeds them. According to recently published Government figures Farmers

income rose last year by a staggering 45% compared with most of the rest of us barely holding our own in spite of falling inflation rates. On average also the subsidy per Farmer from the taxpayer was £13,000 for the year, although in all probability the big boys ended up receiving far more of this than the little man. If farmers and others object so much to being the owners of SSSI's and areas of outstanding natural beauty why do they fall over themselves to pay high prices for it in the first place. The answer would seem to be that with suitable change of use, or claiming of Government subsidies, enormous capital gains and profits can be made. But it is a gamble. Those who gamble and lose have only themselves to blame. They should not accuse others of making them lose.

— Editor

Notes from a Nottinghamshire member — This weekend marks my second year of retirement. Being very keen on conservation (nature in general) even led to my giving up angling.

Now ornithology and lepidoptery was to be my hobby, but not collecting, until a tiger moth presented itself to me, which fascinated me. I reluctantly killed it and set it up, not perfectly, but this action in October 1979 produced a conservation minded AURELIAN, and the particular garden tiger became my sentimentally special specimen.

Because of my age I decided to collect only British butterflies. I learnt all I could regarding collecting, making my hobby most interesting. I decided to make all my cases, and believe me, I have had two glorious years, a garden laid out specially for butterflies, a complete set of male and female British specimens, and my only collecting interest now is aberrations. Having nearly done collecting butterflies, I started on moths, which I thought I would never do, and I now have more than 200.

What I would like to point out is the fact that in two years, I have acquired two pairs of the extinct Large copper (*Lycaena dispar*), very old, bought in a box of specimens from a second-hand shop.

Caught on the cliff top at Bridlington — an unusual Small tortoiseshell ab *semiichnusoides* of *Aglais urticae*.

To end this season (1982) in October, I put out in the garden a pan of stewed apples (they were in the process of fermenting), and attracted a butterfly I couldn't readily identify from my bedroom window, so I rushed down, and netted an untypical *Polygonia c-album* (Comma), which set up perfectly. I contacted a local AES member, well known for keeping records, who stated this species had not been recorded in Worksop for seventy years, and it came to me!! — E. Ardrom (7412)

A late Clouded Drab — On July 5th 1982, a specimen of *Orthosia incerta* Hufn. was taken at a mercury-vapour moth trap in north-west London (NW11). This is very late for this particular species; does anyone possess similar late records of a possible second brood for this species?

— Peter Hall (7416)

The Falkland Island Dependencies Stamps — With reference to the mention in AES Bull, Vol 41, No. 337 on page 174 of the issue of stamps for the Falkland Islands Dependencies, I can give the following information. The issue consisted of six "insect" stamps of the Falkland Islands Dependencies (i.e. South Georgia, South Sandwich Islands and Shag Rocks). They were not for the Falkland Islands themselves. All six species were from South Georgia as this island has been well investigated from the entomological point of view. There were two species of mites, one collembolan, a beetle, a chironomid midge and a spider illustrated.

The following information has been gleaned from the Deputy Postmaster (South Georgia), Mr R. K. Headland of the British Antarctic Survey. About 8,000 first day covers were produced by the Philatelic Bureau in Port Stanley and delivered to South Georgia (Grytviken, King Edward Point) in March 1982. The first day of issue was 16 March 1982. As far as is known, to date only about 100 other letters, etc. have been despatched bearing these stamps from K.E.P. However, as the stamps are still valid, more will probably be used. None of the stamps used at Grytviken went through the Falkland Islands during the Argentine occupation. Thus, none have overprints, overstamps, etc on them. All the unused stamps from this issue, plus stamped mail and first day covers which were at King Edward Point Post Office on the day of the Argentine invasion, were smuggled out by the Deputy Postmaster.

— Bill Block (4778)

A mild winter — In contrast to the very cold weather experienced during the winter of 1981/82, the period from November to the end of January 1983 has been exceptionally mild in the South, with no snow and very few frosts. Honey bees were flying on Christmas Day and have been bringing in pollen in the last week in January. On Christmas Eve a Small White, *A. rapae* L., was flying at Hanworth, Middlesex and on the 9th January Tim Newnham (4597) reports a Drinker moth male taken at Haywards Heath in Sussex. I found my Fox moth larvae wandering about in the third week of January, sunning themselves on the top of grass tussocks and my *E. aurinia* larvae were also sunning themselves on the 27th January. Larvae of the Purple Emperor were also observed moving about, a bad sign as those that do this usually succumb. In the garden *Chaenomeles japonica* is in flower and the daffodils are budded on the last day of January. The cold winter last year brought a very considerable increase in the butterfly population in the summer — it will be of interest to see what effect the present mild weather has.

— P. W. Cribb (2270)

A late brood of Large white — While picking the first crop of brussel sprouts in my garden on the 19th November, I noticed that one plant was in shreds and at first thought of pigeon damage. Closer inspection revealed the presence of twenty larvae of *Pieris brassicae* L., almost full-fed. We had already had a slight frost and this is as late as I have ever recorded the larvae. I gathered them up and placed them in an outside cage with cabbage leaves, hoping that being so late they might have avoided their enemy, the wasp *Apantales glomeratus*. However, by 1st December, sixteen larvae had produced the typical yellow silken pupae and the other four had taken up pupating positions but had failed to pupate. Temperatures in the week went down to −2°C at night and it seems that this lowered their metabolism to the point where such activities as girdle spinning could not be undertaken.

—P. W. Cribb (2270)

High flyers — In the November 1982 Bulletin there was an account by C. J. Gardiner of *Aglais urticae* L. in Spain flying at 8,100ft. I would like to record that on the 12th August, 1982 *A. urticae* was observed flying over snow at the summit of the Geforne Wand-Spitzen, in the Austrian Tyrol, at 3,270m, just under 10,000ft. Williams in his book 'Insect Migration' records heights of up to 19,000ft in the Himalayas, though he was referring to migrating butterflies. On the same day I saw a specimen of *Iphiclides podalirius* L. in the valley below the Geforne-Wand. Another highlight was a sight of f. *valesina* of *Argynnis paphia* L.

— G. H. Band (4491)

THE ENTOMOLOGY OF CARNIVOROUS PITCHER PLANTS

Much has been written about the insect prey of carnivorous plants, but very much less is known about those insects which inhabit them and/or feed upon them, or upon their contents, with no apparent adverse effects. Even Darwin, who was the first to write an entire book on carnivorous plants (using *Drosera rotundifolia*, the common sundew, as the main object of his study) made no mention of non-prey insects associated with these plants. This may perhaps be explained by the fact that the pitcher plants (*Nepenthes, Darlingtonia* and *Sarracenia*) are much more amenable to inhabitation by symbiotic and commensal insects owing to their general physiological shape and structure than are the sundews and related groups.

In this article I shall confine myself to describing only insects and spiders which live in association with carnivorous plants. I shall omit animals of other orders — interesting though these may be — such as, for example, the various small frogs which lay their eggs in the pitchers and whose tadpoles live and grow to maturity in the murky pools of liquid at the bottom, diluted by tropical rains.

Sarracenia spp.

The pitcher plants of the genus *Sarracenia*, of which there are nine species, all hail from North America. They are abundant in the Okeefenokee Swamp in Georgia, which I visited, albeit briefly, in 1968 and where I was able to see these bizarre plants at close range in their natural habitat.

Moths which inhabit Sarracenia spp.

The most interesting insect inhabitants of *Sarracenia* pitchers are three species of a small 'micro', *Exyra ridingi, E. semicrocea* and *E. rolandiana*, which display a striking degree of adaptation to such a highly-specialised habitat. F. M. Jones (1921) discovered that some of these moths either lay their eggs singly — one to a pitcher — or in small groups at the mouth of the pitcher. When a single egg is laid, the newly-hatched larva enters the pitcher tube, feeding on the superficial tissues of the tube wall; but, Jones found, if more than one egg is laid one of the resulting larvae drives out or kills all the others — a veritable entomological cuckoo. Jones found that *Exyra ridingi* and *E. semicrocea* tended to lay their eggs singly, while *E. rolandiana* was most prone to lay them in groups, though there was a small degree of variation as to this among the three species.

Jones surmised that those species which laid their eggs on *Sarracenia purpurea* usually laid them in groups because *S. purpurea* grows very densely and the massed pitchers facilitate the migration of 'dispossessed' larvae to adjoining pitchers. Eventually only one larva occupies a pitcher. The pitchers of *S. drummondii, S. flava, S. rubra, S. sledgei* and *S. minor*, however, are widely separated, which hinders such larval migration and therefore these species are tenanted by *Exyra ridingi* and *E. semicrocea*, which usually lay their eggs singly. As Jones remarked in one of his papers (1921): 'Thus the habit of growth of the foodplant determines the egg-laying habit of the associated insect'.

The newly-hatched larva, in all the *Exyra* species, is translucent and very small — only about 2.6 mm. It half buries itself in the tissues on which it feeds, partly-covered with frass and other débris enclosed within the tube. In the pitchers of *S. flava* the larva of *E. ridingi*, on hatching, makes for one of the grooves on the lid-stalk, where it spins a small tent of silk and frass, on the floor of which it settles down to feed.

More mature larvae, of all three species, isolate themselves from the outside world by spinning a diaphragm of silk across the mouth of the tube, either transversely or obliquely according to the position of the lid. In the pitchers of *S.psittacina* the *Exyra* larva spins right across the mouth of the tube, entirely blocking any opening, thus immuring itself in a snug chamber well-stocked with food, protected from its enemies and undisturbed by wind, rain and storm.

'The larvae of the spring brood live in young, tender pitchers' (Jones, 1921). This implies that there is at least a second brood later in the year, though this, unaccountably, is not mentioned in the paper referred to. The larva eats a groove round the tube near the top of the pitcher. Above this point the wall of the pitcher shrivels and dies, sags over and bars the entrance. In the chamber thus formed, the larva hibernates.

In *S.flava* the pitchers wither and die at the approach of winter, at which time the larva descends to the lowest part of the pitcher and plugs it with silk and frass to form a hibernaculum, in which it ensconces itself to await the coming of spring.

Exyra ridingi exhibits a curious variation of this method by carrying out before pupation elaborate preparations for its emergence as a future imago. It cuts an emergence hole above its pupation site, and another small hole below to permit the escape of water, to avoid the possibility of flooding its pupal chamber during winter rains. The chamber itself is constructed of very loosely-woven silk, in order to allow any water to run through. The larva then spins a cocoon of silk and frass in which to pupate.

In *S.psittacina* the larva of *E.semicrocea* cuts an escape hole in the roof of the hood, since the pitcher of S.psittacine has a 'lobster-pot trap' entrance from which exit would be very difficult.

After hibernation, which occurs during the third instar, the larva emerges in spring and feeds voraciously, attacking not the old pitcher in which it has spent the winter but the flowers and young fruits. When ready to pupate the larva cuts a hole in a young unopened growing pitcher, ascends the tube and feeds on the inner tissues. This causes the top of the pitcher to wither and fall over.

Exyra rolandiana does the same thing in pitchers of *S.purpurea* (its only known foodplant). Jones says that 'the larvae of this species bear "lappets" which prevent it from entering and getting stuck in too narrow spaces', and he goes on to state that the larvae of species which feed on widely-spaced pitchers do not bear these 'lappets', this being one of the few diagnostic features between species which are otherwise very similar.

Other insects which inhabit Sarracenia spp.

The solitary wasp *Chlorion harrisi* habitually uses *Sarracenia* pitchers in which to build its nest of several storeys, each of which contains one egg and a food store. This wasp is not, however, confined to *Sarracenia*; in 1939 Jones found it nesting abundantly in the burrows of a ground beetle in a locality where *Sarracenia* does not occur.

A minute (2-3 mm) dipteron, *Dorniphora venusta*, is associated with *S.flava* late in the season when the pitchers are relatively withered and have lost their trapping ability (Jones, 1918). The fly lays its eggs in the

pitchers, and the larvae feed on the decomposed remains of previously-captured prey insects. Another very small fly, *Neosciara macfarlanei* (3-3.8 mm), first described by Jones in 1920, has habits similar to those of *Dorniphora venusta*. The larva feeds on the remains of insect prey in vertical-tubed *Sarracenia* species, and when it is about to pupate it exudes a frothy product, rather like that produced by cercopids (froghoppers) in appearance, which fills the space inside the tube just above the mass of dead insect detritus at the bottom on which it has been feeding. Both these two small flies appear to be confined to *Sarracenia* species, as well as a much larger fly, *Sarcophaga sp.*, whose white maggot-like larvae have also been found feeding on the remains of prey in *Sarracenia* pitchers of various species.

A small mosquito, *Wyeomyia smithi*, lays its eggs in pitchers of *S.purpurea*. In the fluid at the base of the pitcher, diluted by rain water, the larvae grow to maturity. They are said to hibernate frozen in ice during the winter, and the adults, which are harmless to man, are not known to breed elsewhere. Though tropical in its affinities, this mosquito occurs well beyond the border of the USA with Canada.

A minute gnat, *Metriocnemus knabi*, breeds in similar situations, while another closely-related species, *M.edwardsi*, breeds not only in the pitchers of *S.purpurea* but was also found as long ago as in 1875 breeding in the pitchers of *Darlingtonia californica* (Austin) although it was not described until 1916, by F. M. Jones. Little, if anything, is known of any other insects associated with *Darlingtonia spp.*

Arthropod inhabitants of Nepenthes spp.

The many species of pitcher plants of the genus *Nepenthes* are confined to the Old World tropics, mainly Borneo, with outposts in Papua New Guinea, Northern Australia, Ceylon and Madagascar. They may be found from around sea level to 9000 ft. (2744 metres), mostly in dense jungle habitats. Two species occur on Mt. Kinabalu.

Spiders which make their homes with impunity in the pitchers of various *Nepenthes* spp. include *Misumenops nepenthicola* and *M. thienemanni*, of the family Thomisidae or crab spiders, related to our *Misumena vatia*, and two others of the same family, *Thomisus callidus* and *T.nepenthephilus*. These do not appear to be confined to any one particular pitcher plant, as they have all been found in several different *Nepenthes* species. Thienemann (1932) mentions that they are not found in *N.ampullaria* or *N.ventricosa*; however, he offers no conjectures as to why these two host plants are excluded.

Nepenthes ampullaria, however, is very attractive to a great many Diptera. The pitchers of this species stand half-buried in the substratum; it is possible that in such a situation the pitchers are more likely to become filled with rain water than those several feet above ground,

owing to the continuous dripping of water from the upper foliage, especially during tropical storms. The larvae of no fewer than 26 different dipterous species have been noted living in the pitchers of *N.ampullaria*; these comprise six Phoridae, one chironomid midge, and 19 culicid mosquitoes.

It is little wonder that, with such an abundant feast available, the pitchers of *Nepenthes ampullaria* are home to the tadpoles of a number of colourful little rain forest frogs. But that is another story.

ACKNOWLEDGEMENT

My thanks are due to Mr. A. Dowthwaite, Librarian, for his help in translating various papers from the German.

S. J. Patel (751)

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THE JERSEY TIGER MOTH (EUPLAGIA QUADRIPUNCTARIA) AND QUESTIONS RAISED BY THE DIFFERENT COLOUR FORMS.

In the Autumn of 1981 I placed an advertisement in the AES 'Wants and Exchange' requesting information about the Jersey Tiger moth. I asked for observations of the red, yellow and orange forms made in mainland Europe and the United Kingdom and details of the breeding of these forms. In 1982 a small survey of the species in South Devon was carried out. A brief summary of the information gained together with comment follows.

The Jersey Tiger is distributed throughout southern and central Europe including the Channel Islands and South Devon where it was first recorded in 1871. Information provided by AES members visiting mainland Europe indicated that the populations were of the red form only. The Rev. Graham Long writing from Jersey commented that, in 13 years, all the moths he had observed in Jersey and Guernsey were of the red form and the islands' museums contained only three yellow

specimens. Information received to date, therefore, suggests that over most of Europe, the yellow and orange forms occur as rarities. In South Devon, the situation is quite different with the yellow *(f. lutescens)* and orange forms representing a substantial proportion of the population. The orange moths also vary from an orange-yellow to an orange-red colour.

Distribution in South Devon

The species was first recorded at Alphington near Exeter and recent information indicates that it occurs along a coastal belt which extends from Seaton in the east for a distance of about 50 miles to beyond Dartmouth in the south west. Inland the moths appear more common close to the estuaries and are found up to 12 miles from the coast. They do not occur on high ground.

Climate and distribution

South Devon is noted for its mild climate which extends the growing season of plants and reduces the occurrence of frost and snow. This results from the warming effect of the Gulf Stream which has its greatest influence along the south west coast.

It is likely that the species reached South Devon from the Channel Islands. The monthly Met. Office statistics for lowland sites in the Channel Islands highlight the mild climate. The monthly mean minimum temperatures are higher than those recorded anywhere on the south west coast of England. The mean maximum temperatures and hours of sunshine are also high. On the English coast the highest mean minimum monthly temperatures occur in the Torbay area and the coastal towns within the Jersey Tigers' distribution range. These also have high mean maximum temperatures and hours of sunshine.

The further north, within the species' European range, the later in the year the imagines hatch. In Corfu the moths are seen in May and June, in the Channel Islands in July and August whilst in Devon, they are rarely seen before the first week in August. Peak emergence usually occurs around the 15th of the month and the moths are also observed in September.

On looking at the species' life cycle we can see how important the mild climate is. The moths are active and feed under sunny conditions but usually pair in the hour after dusk.

My own observations suggest that pairing is unlikely to occur when the temperature is below 50°F. The eggs hatch in approximately 16 days and the larvae grow slowly during the winter and feed as long as the weather remains mild. They feed at night and in spring and summer, warmer night time temperatures increase their growth rate. In South Devon pupation occurs just soon enough for emergence and pairing to take place before the weather deteriorates.

The Polymorphism

In 1896 J. W. Tutt, who was editor of the Entomologist's Record, failed to mention the colour polymorphism when discussing the species in his book 'British Moths'. The selective pressures which have led to and still maintain its occurrence in South Devon, are uncertain. The Jersey Tiger is a distasteful species which is advertised by its wing pattern and coloration. There is no evidence that yellow or orange are superior to red in producing a predator deterrent effect.

As previously discussed, we can see that the species in South Devon is on the edge of its range and is likely to be isolated from any major influx of new genetic material. In years when the spring and summer weather is poor and the temperatures lower, it appears quite possible that some form of climatic selection has occurred which has favoured the genes carried by the yellow and orange forms, either directly, or through a situation of heterozygous advantage. I have not been able to discover any previous records indicating that the polymorphism varies over the distribution range or from one season to another.

Imagine samples 1982

In July 1982 a letter was sent to a number of members in the distribution area asking them to provide and collect information on the species. August/September is the holiday season and although most of the letters received a generous reply, only one completed set of records was received. For this, I am indebted to Mr. Stanley Toyn of Ebford Topsham near Exeter. Mr. Dick Crowther of Otterton also provided valuable data and assistance. I, myself, visited a number of sites from 8th to 21st of August. The map (Fig. 1) indicates the data collected from each site, giving the total number of moths of each colour form observed and the percentage of the total moths observed these represent. I have also indicated the approximate height above sea level — minimum and maximum figures being used where the ground rises.

Discussion

Allowing for the fact that the samples were small and, with the exception of the Ebford site, only cover a limited time of the emergence period, there is evidence that the proportions of the different forms vary from one area to another.

If the occurrence of the red form is associated with milder climatic conditions and conversely that of the other forms with less mild conditions, the influence of the sea and of the height above sea level could be critical. If this is the case, sites in lowland situations close to the sea or main estuaries especially at the southern end of the distribution range might favour the occurrence of the red moths whilst sites at higher levels, inland and away from water, the orange and yellow forms.

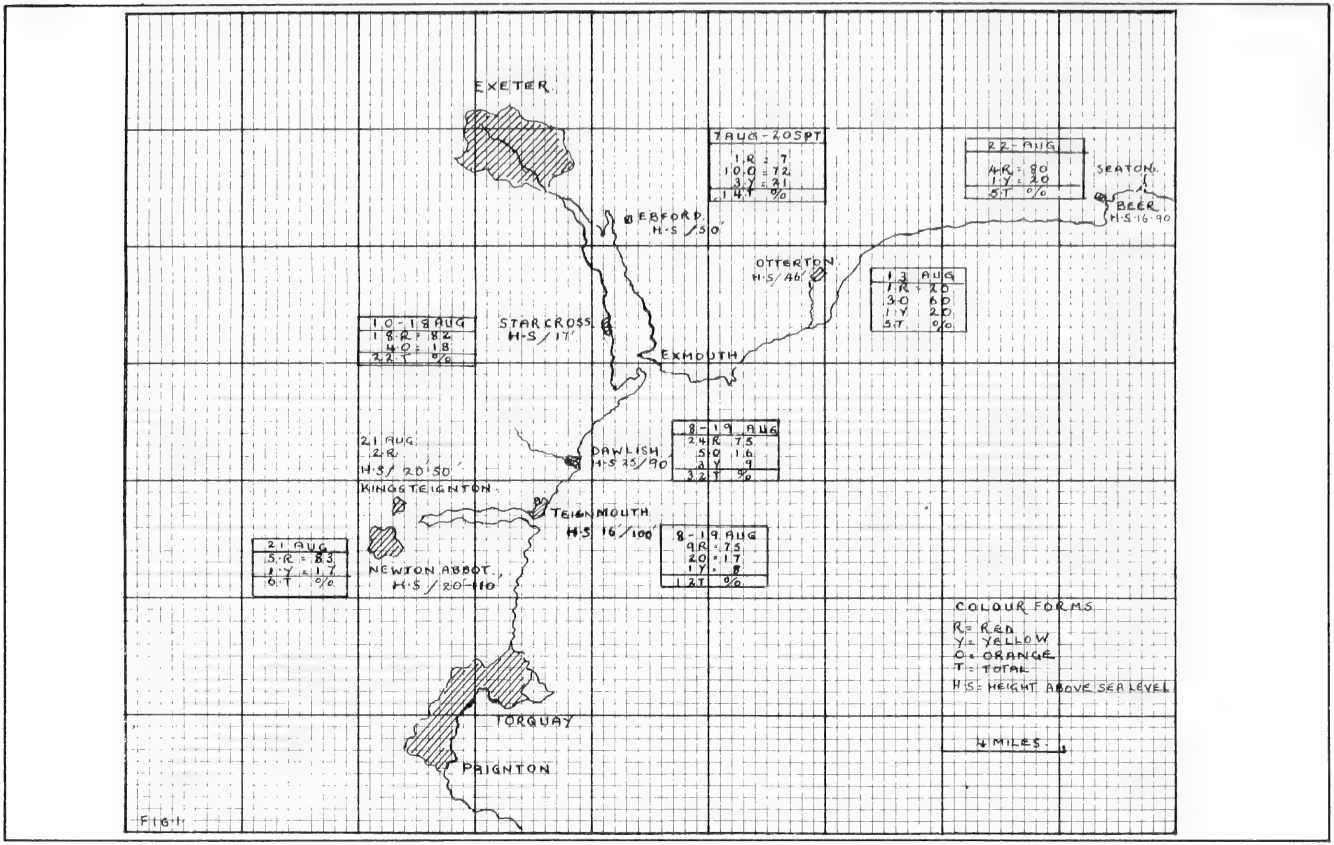

EXETER
7 AUG - 20 SPT
1 R = 7
10.0 = 72
3 Y = 21
1 T %
22 - AUG
4 R = 80
1 Y = 20
5 T %
SEATON
BEER
H·S 16·90
EBFORD
H·S / 50'
OTTERTON
H·S / 46'
13 AUG
1 R = 20
3·0 80
1 Y 20
5 T %
10 - 18 AUG
18 R = 82
40 = 18
22 T %
STARCROSS
H·S / 17'
EXMOUTH
8 - 19 AUG
24 R 75
5·0 16
2 Y 9
32 T %
21 AUG
2 R
H·S / 20·50'
DAWLISH
H·S 25/90
KINGSTEIGNTON
TEIGNMOUTH
H·S 16/100
8 - 19 AUG
9 R = 7.5
2·0 = 17
1 Y = 8
12 T %
21 AUG
15 R = 83
1 Y = 17
6 T %
NEWTON ABBOT
H·S / 20·110
TORQUAY
PAIGNTON
COLOUR FORMS
R = RED
Y = YELLOW
O = ORANGE
T = TOTAL
H·S = HEIGHT ABOVE SEA LEVEL
4 MILES

Fig 1

Looking at the sites in Fig. 1 where reasonable samples were obtained, those of both Starcross and Dawlish are close to water but the former is a wholly lowland site whilst the latter has both low and rising ground. The Ebford site is of particular interest in that this is somewhat inland, a short distance away from the estuary and towards the northern limits of the distribution range. Here, not only were most of the moths observed, orange or yellow, but these forms showed a variability. Three of the orange moths were of a pale type whilst one of the yellow moths had white borders to its wings. The yellow moths were also noted late in the season on the 26th August, 3rd September and 20th September.

The above suggestions are very speculative and more and larger samples are required covering the whole of the distribution range and emergence period. In addition, estimations of population densities and imagine lifespan using "mark, release and recapture" techniques would be of value. In the laboratory the effects of different temperatures during the rearing period would provide important information about the rate of larval growth of the various forms and their crosses and possible modifying influences of temperature on the expression of colour. Investigations into imagine activity at differing night time temperatures could also be carried out.

Genetics of the polymorphism

Dr. E. B. Ford in his book 'Moths' 1955 discussed the genetics of the polymorphism and indicated that difficulty in obtaining pairings in captivity had prevented its study.

Dr. Michael Majerus of the Cambridge University Dept. of Genetics kindly wrote to me regarding the genetics of the various forms. He was particularly interested in the orange forms. He had overcome the difficulty of obtaining natural pairings by using hand-pairing techniques and had been able to confirm that the yellow form is recessive to the red form, the expression of these colours being controlled by genes occurring at the same locus. Pairings obtained in Somerset in 1979 produced a similar conclusion.

In 1982 samples of eggs from eighteen moths representing the red, yellow and differing orange forms were sent to Cambridge University and Dr. Majerus is carrying out a programme of forced and natural rearing to ascertain further information about the genetics of the polymorphism. Broods are also being reared at Crowcombe Heathfield.

Information wanted

As indicated earlier there is a great deal of information needed before any firm conclusions can be drawn about the occurrence of the polymorphism in South Devon. I should be most grateful for any additional information anyone can provide and any sampling help that can be given in 1983.

Postscript
Since the above was written I have been informed by Mr. Thompson-Coon that he has seen three yellow Jersey Tigers near Buckfastleigh, which is twelve miles inland.

Tony Liebert (4903)

(Those wishing to help Mr. Liebert in this study should get in touch with him at The Heathfield, Crowcombe Heathfield, Taunton, Somerset TA4 4BT.)

DISTRIBUTION OF THE JERSEY TIGER MOTH—EUPLAGIA QUADRIPUNCTARIA PODA

With reference to Mr. P. W. Cribb's interesting article in the November last Bulletin, this moth occurs, to my knowledge, mostly near the coast from Churston, just East of Brixham, to the Seaton area. This comprises a distance of 40/50 miles. When I lived at Maidencombe 15 years ago the Southern end of Newton Abbot was a good inland locality.

Since the moth first established itself in South Devon I think that the lack of desire of *quadripunctaria* to spread further and more inland is due to the fact that it has got exactly what it wants in the particular part of the County it has established itself in. In its chosen habitats in the area of the beautiful countryside which it graces, I feel the insect gets protection from the cold East wind which blows in Devon and, with the Southern aspect of its sites, gets the shelter and warmth it likes. The moth loves the latter which explains its liking to sit in the daytime on walls and the ground. I feel it could be that Mr. Cribb's Swiss larvae could have got some protection from the intense cold by being put into a pot with White dead-nettle, which they like very much, and then went into complete hibernation protecting themselves among and under the leaves. But I do not know where the pot was kept during the Winter. I kept larvae going through one Winter when I worked in St. Albans. They were from Devon ova and being kept warm indoors readily ate Groundsel through the Winter, emerging in early June.

It might be of interest if I mentioned some of the insect's habits I observed, as these are what I call specific, when I lived near Torquay 15 years ago. At the beginning of August I used to watch for the first moth flying in the middle of the town. This started a hunt by day on walls and on the ground whenever I was in a suitable locality. The moth comes freely to light, but is restless, and all the variational colour hind wing forms occur with the type all over its area. By day the moth is very alert when at rest and the slightest noise will cause it to fly off. I never succeeded in getting the moths to pair in captivity and think a large enclosure would be helpful to get a pairing. However, a wild female always laid fertile ova very readily.

I always found it very hard to find the larvae at night until I knew the secret, which really amounted to much hard work and persistence. When at Dawlish on holiday in the first week of June 1956 I found a sizeable larva curled up in the morning of June 7th beside my light trap which I was running after closing time on the steps of the Public House, where I was staying. Diligent searching with a lantern in the grounds of the Pub for two nights following failed completely. On moving my light to another good site nearby, to my delight I had another larvae come up and walk over the sheet to the light. Another larvae came the next night to the light. Having established the presence of larvae in this spot I soon found larvae late at night, but not commonly, by searching the underside of Bramble leaves close to the ground. In confinement the larvae are very fond of Comfrey.

Some years ago the Hon. Dr. Miriam Rothschild took a team to Rhodes to search for the larvae there, where the moth is always abundant and a great tourist attraction. There was a long article in the Entomologist about the expedition which did not produce a successful conclusion. I have a feeling that the secretive habits of the larvae over in Rhodes, like in South Devon, would be responsible.

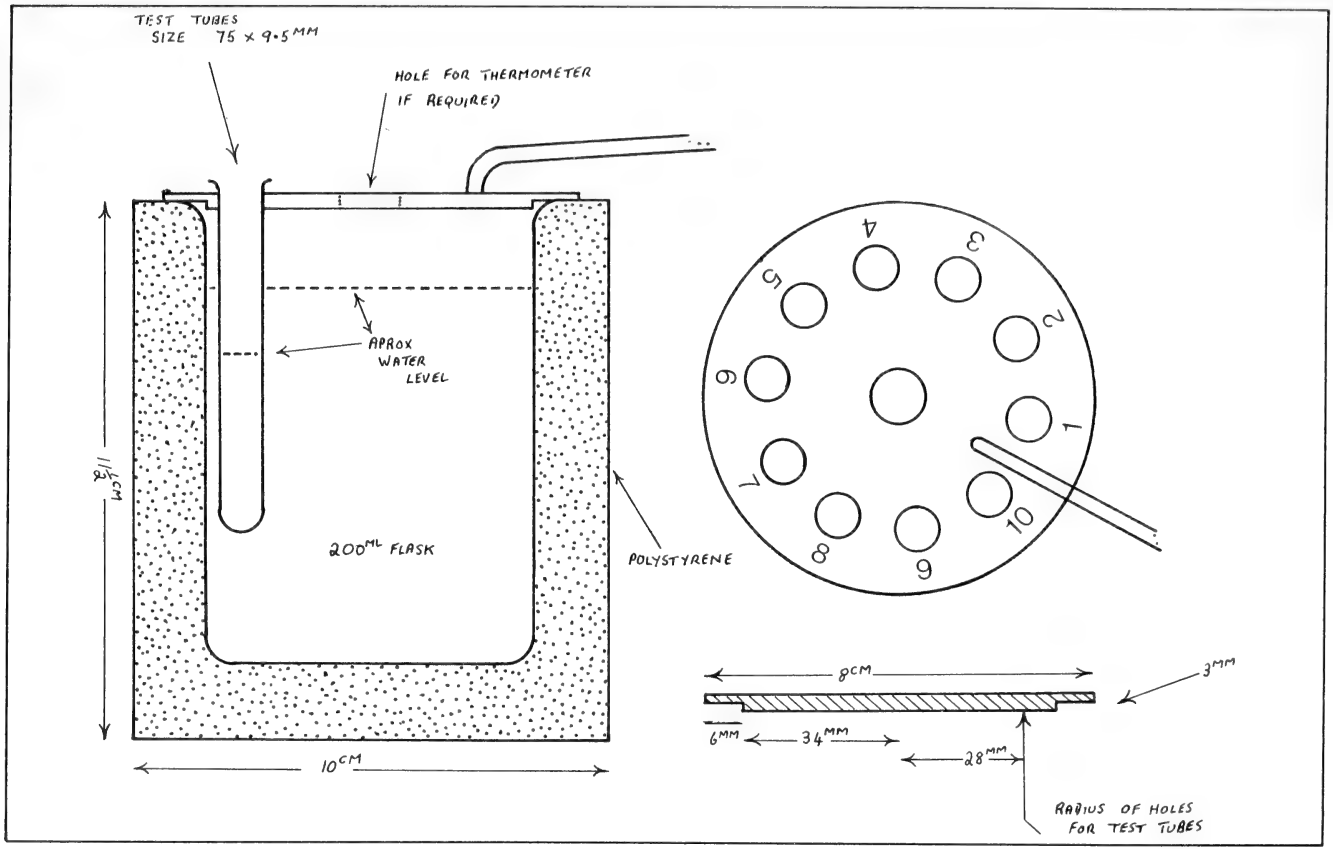
I trust that what I have written will be of interest to Members and particularly Mr. Cribb.

Peter Crow (393)

AN IMPROVED APPARATUS FOR THE PREPARATION OF GENITALIA

For some time now I have been making up genitalia mounts both for reference and identification of moths and have improved the equipment used over the years making the process less complicated and quicker. The most difficult part in preparing the mounts is the boiling out of the speciments in a solution of potassium hydroxide so that only the chitin remains.

The method I use now is to put the specimens in an insulated flask, this gives a good working time of approximately 20 mins for a specimen the size of an average noctuid. The holder that goes into the flask holds ten separate specimens and there is ample time to give individual treatment to each. First of all fill the small test tubes half full of water and put one 100 mg pellet of potassium hydroxide into each tube, followed by the specimen. Next fill the flask with boiling water and leave for a few minutes to warm through. Empty this out and refill again with boiling water to the required level. You can place a few specimens of the same species in each tube if required and four noctuid-size specimens would be the limit. Mounting more than one specimen means that details lost on some, due to them lying incorrectly, will be seen and confirmed in others.


TEST TUBES
SIZE 75 x 9·5 MM
HOLE FOR THERMOMETER
IF REQUIRED
APROX
WATER
LEVEL
200ML FLASK
POLYSTYRENE
11CM
10CM
1
2
3
4
5
6
7
8
9
10
8CM
3MM
6MM
34MM
28MM
RADIUS OF HOLES
FOR TEST TUBES

If large size cover glasses are used, say 22 × 40 mm or 22 × 22 mm, up to four specimens can be mounted on the one slide. If you take one tube out and gently squeeze the specimen against the side of the tube with a seeker it gives a good indication that the fats have dissolved out into the solution and the specimen is ready for mounting. I always leave a few segments of the abdomen on as this allows me to test it and not disturb the genitalia too much. As soon as you think the specimens have dissolved out check them in clean water; if they are not ready place them back in the tube. Aim for a point at which the fats have just gone as this will give a good strong specimen with plenty of contrast leaving them in longer just means they become progressively transparent and weaker.

The drawing of the unit I have shown is self explanatory, the insulation jacket being made of expanded polystyrene. This material is commonly used in boxes for packing and should be not hard to obtain. It can either be made up in one piece or if you can only obtain small bits they can be cemented round the flask and held in position with sellotape (the cement to use is sold in DIY shops for sticking polystyrene tiles to walls and ceilings).

The test tube holder is the only awkward part to make up. The best material to use is brass, but if this cannot be obtained, tin sheet will do. I have given a plan of it and all the dimensions required but it can be altered to suit whatever sizes of containers you can get hold of. If you have access to a workshop they might do the job for you working from the drawings shown. If not you can make it up yourself, perhaps not to the same standard, but it will do the job just the same. None of the dimensions need to be exact, one could use a tin lid, as some, such as those on syrup tins, are lipped around the edge and might just fit a particular flask. It does not necessarily have to be the 200 ml size stated. The hole in the middle of the lid for the thermometer can be left out if not required. The other ten holes in the lid must be drilled out. All test tubes vary in diameter a little so make certain that the hole size will allow the largest of them to go through. If you use a thin tin lid drill a pilot hole first and then open it out with a larger drill followed by a round file. It is important to number the holes 1-10. This can be done using a set of numbered punches. The only job that remains now is to solder the handle on. If brass or tin is used the solder will take very easily.

John W. Philipson (3318)

A NEW COLONY OF STRYMONIDIA W—ALBUM: A QUESTION OF SURVIVAL

On 26th June 1982, after 12 years of observation, I was delighted to record the presence of the White letter hairstreak butterfly (*Strymonidia w-album)* in a locality within five miles of Doncaster town centre.

The general nature of the locality is very varied, consisting of mixed woodland, scrub, rough land and arable farmland. The focal point of the colony, outside which only occasional sightings were made, is a sheltered, richly nectared corner, some 200 sq. yds. in size, which forms the border to a small, but pleasant wood containing a variety of trees including elm. Mature wych elm *(Ulmus glabra)* still stands although common elm *(Ulmus procera)* has been hard hit by Dutch elm disease. Currently in South Yorkshire, the approximate infection rates for the two elm types are 40% and 80% respectively. Unfortunately, the mature wych elms immediately adjacent to the colony are now showing signs of disease.

First sightings of males were made on 26th June and females appeared about ten days later; somewhat early for the species, but no doubt due to the fine weather in May. Interesting observations were: the strong preference of both sexes for thistle blossom in the presence of abundant bramble and the plentiful number of butterflies.

Although the records contained in the publication 'The Lepidoptera of Yorkshire' (Yorkshire Naturalists Union, 1967) indicate that the species was present in the general Doncaster area at that time, "in much reduced numbers", I am unaware of any record involving this precise locality. It would seem nevertheless a near certainty that the butterfly has flown here in living memory, since Porritt described it as common near Doncaster before the turn of the century and present in a wood still standing but altered in character, within two miles of this locality. Mr. S. M. Jackson (Yorkshire Recorder) informs me that he has searched this wood in recent years for the butterfly, but without success. The new locality constitutes a link in a chain of island populations roughly joining larger clusters in mid to North Yorkshire with those in mid Derbyshire; the nearest colonies recorded are approximately 20 km due north and 15 km due south.

The emergence of this colony prompted me to look briefly at some of the factors which will influence its survival with respect to the present epidemic of Dutch elm disease. Most of the points considered are not new, but in a changing situation are very relevant and may be of some general interest to other readers.

The manner of appearance of the colony is interesting, since it followed a classical and well documented pattern. Many recorders have over the years described the almost spontaneous emergence of the species in new or dormant sites, often in very large numbers. This colony, similarly appeared in plentiful numbers with no prior indication. A particularly graphic account of this behaviour is given by Mr. J. F. Stephens in Edward Newman's classic book 'A Natural History of British Butterflies and Moths'. In the face of the ravages of Dutch elm disease such regenerative vigour may prove to be of greater relevance in

the struggle of the species for survival and it is to be hoped that other reports of new colonisations are substantiated and further supplemented. Archer-Lock, in a recent summary of the status of this hairstreak, presented reports from several sources that new colonisation is indeed taking place. It is important in any assessment of the reaction of the butterfly to the effects of the disease that accurate monitoring of both colonial movement and survival is achieved.

The effects of Dutch elm disease on the national elm population vary according to many factors, some well understood, others less so and the movements and survival of the butterfly will at least in part be a reflection of these factors. A few are considered.

Firstly, distribution records of the varieties of elm prior to the epidemic indicate that wych elm was common in northern districts and less so in the south while common elm had broadly the reverse pattern. Smooth leaved elm *(Ulmus carpinifolia)* was found mainly in Cambridgeshire and the south west. This distribution pattern placed the wych elm, generally considered to be the main larval food source, as the dominant species in the northern localities of the White-letter hairstreak and the common elm as the main species in the south. The position of the smooth leaved elm is perhaps less certain since it is generally less common outside its strongholds and is rarely mentioned as a food source.

However, in view of the statement by Higgins and Riley that lime is an alternative food source perhaps *U.carpinifolia* should be less questionable in this respect. It is noteworthy that elm is generally considerably less dense in northern districts and that this fact alone at least helps to inhibit the spread of disease.

Secondly, there is a distinct difference in the susceptibilities of the varieties of elm to the disease, common elm being considerably more prone to infection than either wych or smooth leaved elm. These differences may to some extent be demonstrated experimentally and have a genetic basis. They may also be cultural and due to a multiplicity of factors. These include suckering habit — rootspread of the disease being much more frequent in common elm due to this factor — attractiveness for the elm beetle *(Scolytus scolytus)* and the situation of the tree. There is, for example, variation in survival rate according to whether the tree be woodland — protection probably being offered in this case by the density of other trees in close canopy — or exposed hedgerow trees.

Thirdly, Webber has recently demonstrated the adverse effect of the fungus *Phomopsis oblonga* on the elm beetle. This fungus which appears to be more active in Northern and Western districts may reside commensally on the outer bark of the wych elm, and by invading the inner bark of infected trees seriously affect the breeding cycle of the

beetle, thereby reducing transmission of the causal agent of the disease, the fungus *Ceratocystis ulmi*.

These factors must cumulatively amount to an advantage to *S. w-album* in its northern and western localities by comparison with the south, but the fates are precariously balanced and the issues uncertain. In the south, the picture appears grim with common elm affected to all intents and purposes to 100% level. There may, however, be some qualified grounds for hope since mature wych elm still stands although scattered and reports indicate that in some areas colonies are surviving by using regenerating elm suckers. Moreover, the regeneration of common elm by sucker formation is tremendous and the current rate of disease spread in these is far lower than in mature trees.

All things considered, the deciding factors in the survival struggle of *S. w-album* may well be its ability to use its apparent versatility and adaptability, in order to survive wherever possible and to colonise and re-colonise wherever opportunities present.

I am indebted to Dr. J. N. Gibbs (Principal Pathologist, Forestry Commission) for providing information. Any errors are of interpretation and are mine.

W. E. Rimington (5269)

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BEETLES AT LIGHT

As a partially active lepidopterist I often run an MV light in strange places, as well as a static trap in my garden. Beetles are regular visitors and provide extra interest, and occasional excitement for the light-trapper. These notes were prompted by an observation made on 5th August 1982 when running an MV near Symonds Yat in the Forest of Dean, Gloucestershire. At around midnight a specimen of the "Eyed ladybird", *Anatis ocellata* L. appeared on the sheet. During the next 20 minutes a further four were netted in the forest ride whilst flying towards the light. I cannot recall many other occasions when ladybirds have appeared at light, and wonder if any other members have had a similar experience?

Normally beetles arrive in one's and two's, but on 5th July 1979, at 10.15 pm a small 'flurry' of beetles arrived in the garden trap at Orpington, Kent. They continued to arrive until 10.45 pm when I

estimated over 1000 specimens were present in the trap. They were all the same species, and ran down to *Helophorus (?) laticollis* Thom. (a water beetle). Large beetles cannot fail to attract attention when they arrive — I have been fortunate enough to attract the Great Silver Water Beetle *(Hydrophilus piceus* L.) on three separate occasions (at Cliffe Marshes and Dungeness in Kent, and Romney Marsh in Sussex). Sadly this huge beetle loses much of its natural elegance when lumbering around a moth sheet. I have never seen *Dytiscus* at light, but on two occasions specimens have landed on the car at dusk. In the New Forest a *D.marginalis* L. crash-landed on the dark-green bonnet of my car, and some years later at Cliffe Marshes a fine male *D.circumflexus* F. was attracted to the roof of the car (this car was bright yellow). Presumably the beetles mistook the highly polished (!) paintwork for water.

Male Stag beetles *(Lucanus cervus* L.) occasionally appear, although perhaps their infrequency is a reflection of their relative scarcity these days, at least in the South East. They are highly active when disturbed in flight. On one occasion a large male descended from the gloom at around 11.00 pm. I picked him up and was pleased to record (although not at the time) that he savaged my finger, and actually drew blood. Until then I had fondly believed the statement in Linnsen's "Beetles of the British Isles" that the male's mandibles, whilst looking fearsome, cannot bite. Perhaps the explanation for this painful discrepancy is that Stags are usually handled during daylight hours when they are modestly torpid, and not fully 'warmed-up' for a night's activity. Both of the other British Lucanid species have visited the trap — *Dorcus parallelipipedes* L. (the Lesser Stag) on several occasions, but only once have I seen *Sinodendron cylindricum* L. — again only males seen at light. I have never taken any geotrupids at MV, perhaps because theirs is a dusk flight, but recall an incident in North Wales during the hot summer of 1976 when partaking of some liquid refreshment at around 10.00 pm, a large Dor Beetle *(Geotrupes stercorarious* L) collided noisily with an overhead garden light, and plunged into my freshly-drawn pint. Further investigation revealed one beetle and numerous mites enjoying an evening swim. On this occasion I kept the beetle and left the beer. Other dung beetles are regular visitors, the most common and numerous being the *Aphodius* species, although I once found a specimen of the delightful little scarab *Onthophagus coenobita* Herb. in my garden trap.

The only beetle I classify as a nuisance at light is the cockchafer, *Melolontha melolontha* L. — I recall on one occasion the envelope of an MV bulb cracking after sustaining a direct hit from an airborne chafer. Being suitably enraged, I hurled the offending beetle back into the night, only to watch it fly, boomerang-style, directly into the light again. This is an excellent beetle for observing coleopterous 'take-off' habits. When active, this beetle climbs to the highest point — an extended finger is

most suitable — extends its magnificent antennae for a few seconds, unfurls its wings, and takes off. Just before lift-off one can feel a heavy vibration, not unlike that experienced when a large hawk-moth is allowed to warm up and fly away. Other species of chafer appear from time to time, the most common being the small species *Serica brunnea* L.

Of the silphids, *Nicrophorus humator* Gled. occurs regularly at light, usually covered with mites and smelling foul. I never place these insects in pill boxes now as the stench remains for weeks. Other species seen at light include *N.investigator* Zett. at Cliffe Marshes, *N.interruptus* Steph. from N. Wales and *Necrodes littoralis* L. from Ham Street Woods, Kent. For the sake of records, I have also taken the following species at MV light at Orpington, Kent: *Dromius meridionalis* Dej., *Oxytelus rugosus* F., *Cantharis rufa* L., *Malthinus flaveolus* Pk., *Heterocerus fenestratus* Thunb., *Cortinicara gibbosa* Hubn. and *Tornicus piniperda* L.

Paul Sokoloff (4456)

NORTH AND WESTERN FRANCE 1979

I had previously visited Calais and Boulogne once each for a day trip. I was now to embark on a three week camping holiday in France with my wife and two young children together with a friend, his wife and two youngish children. My friend was not then a collector of insects so I was not expecting too much use out of my butterfly net.

We all set off in a single Land Rover for Soullac-sur-Mer, a large campsite on the south side of the Gironde estuary. It actually lies on the Northernmost part south of the estuary presumably built up over the centuries as a sand bar. We camped in a wooded area close to the sea. The campsite and beach were exceptionally good. The beach proved biologically exceedingly interesting but after a few days of eye strain I got used to it. For lepidoptera, however, I would have to look elsewhere.

Around the campside I caught a number of geometrids (all of the same species but as yet unidentified) one Jersey tiger and one Map butterfly. The last was actually caught by my friend's son.

We ventured further south, about halfway to Bordeaux with some interesting results. We saw one Swallowtail, two Clouded yellows, some Whites and a few Browns. I took up chase for the Swallowtail which passed by the far side of some fresh, green looking, saplings. To save time, I ploughed through to emerge with blood trickling down both legs. Needless to say the butterfly escaped but we were all invited to take Cognac with a French family on holiday in a nearby caravan. Our lack of French and their lack of English made conversation rather comical but their warmth made up for some of the coldness we had felt in the Northern towns we had visited.

Despite my injuries in the thorn tree my friend and his children were beginning to warm to chasing insects with big nets. Luckily this trip ended, entomologically, very well. Before catching the ferry across the channel we stopped at a small campsite at Ailly-sur-Noye, a short hop away from Calais. It is, I believe, a weekend fisherman's campsite. The amenities offered were clean and adequate but nothing special. The butterflies were another story.

We arrived early afternoon and, after setting up camp we went for a stroll. We took a path under a railway bridge which then opened out into a field. First we came across a steep sided depression which was crawling with the Chalkhill blue, *Lysandra coridon*. I also caught a female Garden tiger in the act of egg laying. As we mounted the crest we came to a field which had been ploughed below us and a wide grassy track ahead. I have been caught on cine-film chasing up and down this track after a male Clouded yellow, *Colias crocea*, eventually disappearing from sight down the 10 foot high, steep bank, to reappear wildly crossing the ploughed field still in pursuit. I eventually caught it in the flowery verge on the other side only to release it as in too poor a condition. The whole bank was alive with butterflies and the following were noted: Chalkhill blues, *Lysandra coridon*; Common blues, *Polyommatus icarus*; Pale Clouded Yellows, *Colias hyale*; and Bergers Clouded Yellow, *Colias australios* together with a number of Clouded yellows, *Colias crocea*; Large skipper, *Ochlodes venata*; Small whites, *Pieris rapae* and even a Little blue, *Cupido minimus*.

The following morning, when the sun was sufficiently high in the sky for insect activity we took another look and found the same entomological delight. We then, however, made a tour of the ponds and river bank and found a brown hairstreak, *Thecla betulae*, and large numbers of Small tortoiseshells, *Aglais urticae*; Red Admirals, *Vanessa atalanta*; Peacocks, *Inachis io*; and Brimstones, *Gonepteryx rhamni*.

This simple 24 hour period made up my mind to return and converted my friend and family to collectors and breeders of lepidoptera. We did return in 1981 to a similar welcome by the butterflies but after a successful 'bug hunt' in the South of France; but that is another story.

After three weeks together in a single vehicle and neighbouring tents our two families have remained friends, which many people consider an achievement of itself.

Roger A. Wright (6598)

FRANCE 1980

After our successful camping holiday in France in 1979 we decided to try again but this time to the Mediterranean coast. This year our two families travelled in separate estate cars. We set off on 10th August just before dawn to make a dawn crossing of the Channel.

It turned out to be a pleasant day in France and we saw many Whites, Browns and Vanessids. We stopped at a flowery field at Nemours to stretch the legs and air the nets and in a few minutes had caught Painted Ladies, *Vanessa cardui*; Meadow browns, *Maniola jurtina*; Gatekeepers, *Pyronia tithonus*; Marbled white, *Melanargia galathea galathea*; Essex skippers, *Thymelicus lineola*; Green-veined white, *Pieris napi* and a Geometrid, the Latticed heath, *Chiasmia clathrata*. The predominant flower in the field was field scabious or its French equivalent.

We camped at Bonny-sur-Loire in pleasant surroundings. We found a flowery field, a dried up loop of the river with some very interesting wild flowers and edged with willows (the smaller bushy varieties like sallow). We caught Green-veined whites, *Pieris napi*; Speckled woods, *Pararge aegeria tircis*; Meadow Browns, *Maniola jurtina*; Gatekeepers, *Pyronia tithonus* (predominantly male); Painted Ladies, *Vanessa cardui*; Peacocks, *Inachis io*; Commas, *Polygonia c-album*; Map (only one), *Araschnia levana* f. *prorsa*; Common Blue *Polyommatus icarus*: and the Large skipper, *Ochlodes venata*. We also caught another geometrid, the Common Heath, *Ematurga atomaria*.

Before our next overnight stop we found another interesting site at Le Mayet. This consisted of a grassy, flowery wasteland around some gravel workings. We caught the Swallowtail *Papilio machaon bigeneratus*; Queen of Spain fritillary, *Issoria lathonia*; Marbled whites, *Melanargia galathea galathea*; Gatekeepers, *Pyronia tithonus*; Common blues, *Polyommatus icarus*; Small copper, *Lycaena phlaeas*; Brown Argus, *Aricia agestis*; Essex skipper, *Thymelicus lineola*; and a Narrow-bordered five-spot burnet.

In the Massif Centrale amongst arid looking scrubland and vineyards we found numerous browns. We caught the Hermit, *Chazara briseis*; Tree grayling, *Hipparchia statilinus*; and the Gatekeeper, *Pyronia tithonus*. We also saw young Preying mantids, huge bush crickets including one huge female with its large 'Sabre' on its rear, many grasshoppers including a blue winged form, Cicada exuvae, and large red-bodied and blue-bodied dragonflies hawking between the vines.

As we approached the South of France my thermostat (the car's that is, not mine personally), started to play up and we had to drive with the heater on to prevent boiling over. At least my wife never complained of being cold. We originally planned to stay near the Spanish border to give easy access to the Pyrennees but the town in question reminded me too much of Piccadilly Circus in the rush hour so we made our way back North along the Mediterranean coast. We came to a place called Narbonne Plage which fitted us in for a couple of nights. It was soon full as our visit coincided with the French holiday period. After two days the campsite emptied (relatively speaking) and so we stayed on for two weeks. It proved a very pleasant campsite and quite interesting surroundings.

The area in the immediate vicinity was like a dry sandy saltmarsh. Behind the campsite, about a half mile away, the land suddenly rose steeply a few hundred feet or so to form arid scrubland and vineyards. Much of the scrub included highly aromatic herbs such as thyme and marjoram. There were some stands of conifers, patches of thin grassland with what looked like dried Fennel, and some flower bedecked meadows.

On our forays in this area we caught and identified *Papilio machaon* quite commonly; the Kite swallowtail *Iphiclides podalirius* but once; Large white, *Pieris brassicae*; Small white, *Pieris rapae*; Southern small white, *Pieris manni*; Green veined white, *Pieris napi* (one specimen with a wingspan of only 31 mm); Bath white, *Pontia daplidice*; Clouded Yellow, *Colias crocea* (the female was found both in the normal form and form *helice*); Brimstone, *Gonepteryx rhamni*; Cleopatra, *Gonepteryx cleopatra*; Wood white, *Leptidea sinapis*; Painted Lady, *Vanessa cardui*; Red Admiral, *Vanessa atalanta*; Spotted fritillary, *Melitaea didyma*; the Grayling, *Hipparchia semele*; Tree Grayling, *Hipparchia statilinus*; The Hermit, *Chazara briseis*; Striped Grayling, *Pseudotergumia fidia*; Great Banded Grayling, *Brintesia circe*; Meadow brown, *Maniola jurtina*; Southern Gatekeeper, *Pyronia cecilia*; Small heath, *Coenonympha pamphilus*; Dusky heath, *Coenonympha dorus*; Wall butterfly, *Lasiommata megera*; Specked Wood, *Pararge aegeria tircis*; Small copper, *Lycaena phlaeas*; Brown argus, *Aricia agestis*; Common blue, *Polyommatus icarus*; Chalkhill blue, *Lysandra coridon*; Large Grizzled Skipper, *Pyrgus alveus numidus* (I think!); Red Underwing Skipper, *Spialia sertorius*; Dingy skipper, *Erynnis tages*; Mallow skipper, *Carcharodus alceae*; Silver-spotted skipper, *Hesperia comma*.

Roger A. Wright (6598)

to be continued

A BRIEF WINTER VISIT TO TUNISIA

On the 19th of January I and a friend went to Tunisia for seven days, where we stayed at a hotel between Nabeul and Hammamat, on the northern part of the Golfe de Hammamat. The weather was mostly sunny but cool, the temperature being kept down by a high wind, though for the last three days the temperature rose to 70°F.

Though I had been told by locals that 'les papillions' would not be on the wing until March, I went for a few walks into the hills a couple of kilometres behind the hotel, following the course of a wadi. The vegetation consisted mainly of heath, *(Erica)*, pine, *(Pinus)* and rosemary *(Rosemarinus officinalis)*, and it was on the latter that I was surprised by the profusion of insect life, around the sheltered banks. There were many bees, especially African bees, gathering nectar. So many, in fact, that

brushing against clumps of rosemary was hazardous; my companion was stung once, and on two occasions the bees' vindictiveness forced us to retreat.

The banks of the wadi, sun-baked mud cliffs up to 20 m high, housed unidentified wasps and solitary bees burrowing and visiting their holes. In some places there were up to six active holes per square metre.

I had the joy of seeing my first caterpillars of the year on a pine tree about 4 km inland, and perhaps 100 m above sea level. They were in and on two silk nests at the end of branches 0.8 m and 1.0 m from the ground. The enclosed needles were brown, unlike the rest of the tree which was a bright green from new foliage. There was no obvious frass in the nest nor any signs of feeding. Each nest was the size of two clenched fists, with 15-20 larvae in each. The larvae were about 25 mm long, covered with creamy grey hair except for a 3 mm wide band of russet brown hair running down their backs. Unfortunately I was pulled away by my companion due to the anti-socialness of the bees. I would suggest that the nests were used for overwintering. Unhappily my lack of experience does not enable me to identify them to my satisfaction, and their description does not wholly coincide with that of the Pine Processionary (*Thamatopeia pityocampa* L.). Could someone please point me in the right direction?

My next surprise happened whilst sampling some of the local nectar in the hotel foyer. A Humming-bird Hawk-moth *(Macroglossum stellatarum* L.*)* joined us, it examined my shirt for a few seconds, then settled by the window where I caught it and put it out. It ignored the Bougainvillea and Common morning glory *(Ipomea purpurea)*, which was in the full bloom, and flew off over the hotel. I was particularly surprised to see this lovely creature considering it had sleeted just a few days earlier. Is this insect continuously brooded or can it survive on the few flowers found during the Mediterranean winter, breeding in the spring?

The only other items of interest seen were two solitary black and white butterflies with a wingspan of about 4 cm moving fast and nervously on the Bougainvillea — and a third instar locust!

I can certainly recommend Tunisia to any entomologist suffering 'winter withdrawal symptoms', since it is very cheap compared with other winter escape resorts, and offers a good deal to the entomologist in his hibernaculum. One can only speculate as to what is to be seen in February and March, but it can only be colourful and interesting but beware of the bees.

Simon Moxey (5458)

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ANNUAL EXHIBITION

The A.E.S. Annual Exhibition will be held at the Civic Centre, Lampton Road, Hounslow, Middlesex on Saturday, 8th October 1983, 11 am to 4 pm.

The Centre is well placed for access by roads, buses and from the adjacent Tube Station, Hounslow Central (Piccadilly Line). There is ample free parking, refreshments will be available and many Natural History Dealers are attending.

Exhibitors are reminded that 'Application for Table Space' should be made to the Organiser.

All enquiries to Colin Hart

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THE BULLETIN OF THE AMATEUR ENTOMOLOGISTS' SOCIETY

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BULL AMAT ENT SOC

EDITOR:

BRIAN O. C. GARDINER, F.L.S., F.R.E.S.

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(Founded in 1935)

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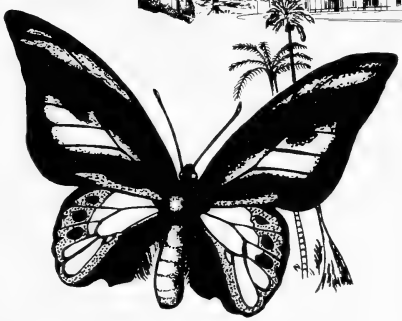

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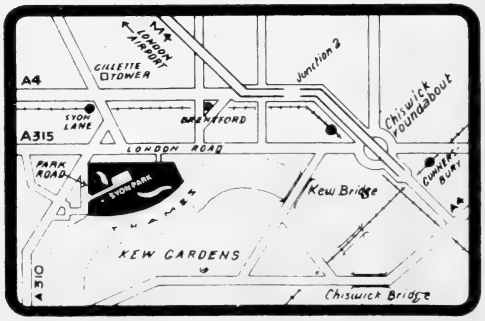

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AES BULLETIN

No. 340

FROM OUR PRESIDENT

The AES was founded in 1935 and grew slowly to a membership of around 100 by the beginning of World War II.

There can be little doubt that the Society would have died but for the devoted attention of B. A. Cooper during the war. He kept in touch with the members, scattered as they were, by means of a 'Wartime Exchange Sheet' and, when the war ended, brought together the members to build the Society into the flourishing one it is today.

Its aims have not altered much since those early days although it could not then be seen what destruction of habitat and what diabolical chemical 'blessings' would be in existence in under 50 years.

Our members now are interested in a wider field, having the advantages of easy travel and correspondence with entomologists world wide, but their interest as 'amateurs' in the science is still the same as it was.

It is well to remember that the word amateur is not, as some suppose, the opposite to professional but is derived from a Latin word meaning 'to love'.

A professional can as well be an amateur as the veriest beginner. B. A. Cooper would have well understood this as his life was dedicated to entomology, both privately and as a career.

The AES continues to serve the Entomological community by keeping us in touch with each other through the Bulletin, through excellent publications on various subjects, and through the great Annual Exhibition.

Not all members are able to attend the exhibition but I do urge any who can, and especially those who have not previously done so, to come along to Hounslow on Saturday, 8th October. You don't know what you have been missing.

It is especially important for members to support the exhibition not only by attending but by bringing an exhibit. Remember that any exhibit is better than none. A single insect can sometimes be as interesting as a large display. Do not feel that what you have to show is not worthy. We are all interested in what *you* are doing, that is what the AES is all about.

E. W. Classey

THE HAMMOND AWARD

As announced in the Bulletin last year, this annual award is for the best article published in the Bulletin each year and is selected by a panel of judges after the publication of the November issue.

The winner of the first award is Mr R. D. Sutton (5309) for his article *The Male Scent Scales (Androconia) of the British Butterflies* which appeared in the March issue of Volume 41, pages 7 - 12.

ANNUAL EXHIBITION

This will again take place in the Hounslow Civic Centre and will be held on Saturday, October 8th from 11.00 am to 5.00 pm, and the entry fee of 30p will be the same as last year.

In order to simplify the judging and presentation of the Ansorge award for the best *Junior* exhibit, the announcement of the winner will be made at 2.30 pm and we would ask that all Junior exhibitors are standing by their exhibits just before that time.

In addition to the award, it is intended this year, and in the future, to give a highly commended certificate to the runner-up.

CONSERVATION VOLUNTEERS WANTED

The Conservation Committee of the Society requires the help of further members and volunteers are required. One appointee at least should live in the London area so as to be able to attend occasional meetings, but others are required to keep a watching brief and to report on conservation affairs in other areas, or indeed even give some physical help on reserves. The duties really are not at all onerous and Colin Hart, Fourpenny Cottage, Dungates Lane, Buckland, Betchworth, Surrey RH3 7BD, would be pleased to hear from anyone willing to help.

REPORT OF THE COUNCIL FOR 1982

The Council is pleased to record a successful and productive year. Our membership now totals 1729. For the first time, in some years, we have had a slight decline in membership. It is not easy to postulate reasons, but they are likely to include budgeting cuts by some, other interests with some teenagers and 'forgetful' subscribers now being excluded.

It is pleasing to say a stalwart of the Society, our Bulletin Editor, B. O. C. Gardiner was elected an Honorary Life Member for his services over many years. On other personal notes D. Keen, our author on Dragonflies, has had to resign from Council due to travelling difficulties, similarly N. Cooke, an ex-Treasurer, has now become a non-voting Scottish Correspondent.

The Bulletin has appeared on four occasions. Regrettably we were compelled to change printers from Messrs Pike to Cravitz, because of unacceptable delays in publication. It should be said that Pikes had given us a good service. Other supplementary literature, such as Wants and Exchange lists, subscription notices, Exhibition and AGM notices were included in our mailing. No membership list has been issued in order that a more complete list be issued in 1983.

This year we launched the new edition of the Silkmoth Rearers' Handbook by B. O. C. Gardiner, this being a case-bound publication with many superb colour plates. It has received much praise and its publication was only possible because of the generous Cyril Hammond Bequest.

A revised and extended edition of the Mayflies has been written by Dr T. T. Macan, entitled 'The Study of Stoneflies, Mayflies and Caddis Flies', and the conservation leaflet 'Butterflies in the Garden' was sold out very quickly and has been re-printed.

At the 1982 AGM we were given an amusing and thought-provoking talk by the retiring President, Mr P. Sokoloff, entitled 'How to succeed as an insect without being eaten'. For an innovation exhibits were encouraged and it was pleasing to see illustrations, livestock and set specimens.

Our Annual Exhibition was held at the same venue for a higher hire fee. Again the Hounslow Civic Centre proved a most acceptable venue. A few writers expressed concern about sales of insects, but on balance it seemed what members expected, your officers keeping an eye open for infringement of our policy on endangered species or long series.

The special exhibit by Messrs Haugham and Low of Ornithoptera was a rare treat and proved most popular, it also helped dispel some myths as to the status of many species.

Sadly we must record the death of some of our members. Beowulf Cooper, a founder member, whose obituary was recorded in the November 1982 Bulletin, probably more than any other member, was responsible for the continued existence of the Society during the war years and immediately post-war. It is pleasing to note that his early AES literature has been acquired by the Society.

R. Watson, Honorary Auditor, a member for many years, was a noted collector of fine British Lepidoptera. His ambition to breed a 'Yellow Cinnabar' was unfulfilled. His superb collection was bequeathed to the British Museum (Natural History).

S. A. A. Painter
(Honorary Secretary)

REPORT OF THE TREASURER

The year ending 31st December 1982 was rather better than expected, with the General Fund income rising by £1,872; principally due to the increase in subscription rates. Expenditure increased by £745, partly due to a change to a more expensive printer in order to obtain Bulletin delivery on time. In consequence, the excess of income over expenditure was up by £1,127 to £1,929. The increase was significantly greater than expected, largely due to a decision to delay the reprint of the membership list until 1983.

On the Publications front, the year was rather disappointing with sales down by £154 to £3,775. The most significant expenditure was on a new edition of the Silkmoth Rearers' Handbook, at a total cost around £9,250. This was largely financed from the Hammond Trust Fund — the Council, agreeing to the transfer of £7,000. In consequence, the Publications Fund achieved a notional surplus of £8,002 and the total value of the Fund now stands at £21,464.

The Society was also fortunate in receiving a further bequest of £11,100 from the late Cyril Hammond. The Hammond Trust Fund now stands at £17,049, as a result of this additional bequest, the transfer of £7,000 to the Publications Trading Account and interest on capital from the National Savings Investment Account.

R. A. Fry
(Honorary Treasurer)

AMATEUR ENTOMOLOGISTS' SOCIETY
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER 1982

EXPENDITURE

1981 £		1982 £	1982 £
	Bulletin Costs:		
109	Editorial	104	
3214	Printing	3862	
1478	Despatch	1600	
45	Indices	60	
			5626
	Membership Services:		
205	Membership List		
57	Wants/Exchange Lists	98	
			98
	Administration:		
199	Stationery & Notices	252	
111	Postage & Carriage	131	
677	Registrar's Fees	689	
170	Meeting Expenses	215	
35	Study Groups Support	40	
28	Depreciation	198	
47	Insurance	50	
49	Sundry Expenses	61	
			1636
223	Conservation		32
6647			7392
802	Surplus Income to General Fund		1929
7449			9321

INCOME

1981 £		1982 £	1982 £
	Subscriptions:		
4215	Ordinary & Affiliate	6504	
548	Junior	627	
71	Life Membership Fund	111	
			6342
	Other Income:		
628	Donations		608
227	Enrolment Fees		197
	Investment Incomes (Gross) ..		
157	Dividends etc.	224	
431	National Savings Interest	523	
			747
284	Advertising Revenue	678	
851	Annual Exhibition	715	
37	Badges & Tie Pins	34	
			1427
7449			9321

BALANCE SHEET AS AT 31 DECEMBER 1982

1981 £	£		1982 £	£
		General Funds:		
		Balance at 1st January, 1982	4733	
3931		Add: Surplus Income for year	1929	
802				
	4733			6662
	1421	Life Membership Fund		1638
	177	Ansorge Award Fund		187
	10792	Hammond Trust Fund		17049
		Creditors:		
815		Advance Subscriptions ..	1706	
61		Advance Donations ..	303	
13		Others	36	
	889			2045
	18012			27581

1981 £	£		1982 £	£
		Fixed Assets:		
465		Office Equipment at Cost	1162	
353		Less: Depreciation to date	374	
	112			788
		Investments at Cost:		
		£1997.30 Treasury 8½%		
1050		1984/86	1650	
		£561.07 Treasury 8½%		
500		1980/82	—	
		£712.24 Treasury 12¾%		
480		1995	660	
		£897.87 Treasury 9½%		
660		1998	740	
150		109 M. & G. Charifund Income Units	150	
		National Savings Investment		
14071		Account	21352	
	16911			24552
		Current Assets:		
171		Stocks at Cost	124	
158		Sundry Debtors	581	
		Cash at Bank:		
600		Current Account	1476	
60		Cash in Hand	60	
	989			2241
	18012			27581

PUBLICATIONS FUND AT 31st DECEMBER 1982

1981 £	1981 £		1982 £	1982 £	1981 £	1981 £		1982 £	1982 £
11360		**Balance at 1st January 1981:**	12972				**Investments:**		
		Add: Trading Surplus for					National Savings Bank		
1223		the year	8002			3192	Investment Account ..		2682
		National Savings Bank					**Current Assets:**		
389		Interest	490				Stocks at lower cost		
					6548		or valuation	15644	
	12972			21464	3669		Sundry Debtors	3205	
	1574	**Creditors:**		1510	1137		Cash at Bank	1443	
	14546			22974		11354			20292
						14546			22974

STUDY GROUPS FUND

	171	**Balance at 1st January 1981:**		296			**Current Assets:**		
		Add: Surplus Income for				—	Debtors		—
	125	year/(Deficit)		127		296	Cash at Bank		423
	—	Creditors		—					
	296			423		296			423

PUBLICATIONS TRADING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER 1982

1981 £		£	1982 £	1981 £		£	1982 £
	New and Revised Publications:			3934	**Sales (Gross):**	3775	
	Costs:			—	Increase in Value of Stocks ..	9097	
4	Editorial	12			Transfer from Hammond Trust Fund	7000	
636	Printing	10348					19872
			10360				
1574	Selling and Other Expenses ..		1510				
497	Decrease in Value of Stocks		—				
2711			11870				
1223	Trading Surplus to Publications Fund		8002				
3934			19872	3934			19872

R. A. FRY, Hon. Treasurer

The Report of the Auditors to the Members of The Amateur Entomologists' Society

We have examined the records of the Amateur Entomologists' Society, and in our opinion the Balance Sheet gives a true and fair view of the state of affairs on 31st December 1982 and of the Income and Expenditure for the year ended on that date.

A. J. PICKLES, F.C.A.

Robert W. Watson & Co.
23/25 New Street
Lymington, Hants.

REPORT OF THE SOCIETY'S REPRESENTATIVE ON THE JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS

There have been two meetings in the past year and I attended both, on the second occasion it was decided that the constituent organisations could have more than one member in attendance, this will be an advantage when discussion of specialised topics arises.

During the year it was agreed to invite an observer from the National Trust to the meetings, the AES particularly welcomes this move since many very good habitats exist on National Trust land.

The JCCBI is represented by Dr Paul Whalley on the Wildlife Link Committee which in turn has access to the Nature Conservancy Council, the Government and both Houses of Parliament. Dr Whalley has recommended that our membership is continued because Wildlife Link has at least some influence in government departments and it has a very large number of constituent members. Membership is by subscription and this may be expected to rise in the future. The AES pays a proportion of the fee amounting to £35 currently.

Butterfly year has finally finished and has been most successful both in raising money and bringing these insects to the public's attention. The World Wildlife Fund has some money which is to be used on small butterfly projects, and applications to fund surveys, site protection schemes and the like are invited from AES members.

Considerable time was spent at one meeting in discussing the re-establishment or reintroduction of insect species. The Committee recognises that views are apt to be strongly polarised on this question, and this was even reflected within the membership of the meeting. The JCCBI intends to publish a code of practice in the future but first it would like an open discussion of the various opinions to take place. It has been agreed that this should be within the bulletins of the two largest member organisations, that is the British Butterfly Conservation Society and the AES respectively.

Members may know that the protected insect species may not be handled in any way without a licence from the Nature Conservancy Council. Mr Stubbs stated that these licences would be issued to amateur entomologists for responsible and bona fide conservation work.

Finally, the JCCBI has continued to sponsor surveys of critical insect species, the following are of particular interest.

The Large blue. — There have been no further sitings and the JCCBI continues to press for re-establishment in one isolated site.

The Heath fritillary. — One more colony has been brought to the survey officer's notice but two have died out. On the whole this species had a fairly good year.

The Silver-spotted skipper. This butterfly suffered a serious decline in the late 1960s which is thought to be associated with the change of habitat resulting from the decline of the rabbit population. A full-scale survey last year identified about fifty colonies, the strongest area is on the North Downs in Surrey. There were several new colonies found and the species seems to be increasing in numbers slightly.

Colin Hart

REPORT OF THE CONSERVATION COMMITTEE

Committee work and representation

This Committee met twice during the last twelve months, on 5th September 1982 and 30th January 1983, and has organised representation for the Society at all recent meetings of the JCCBI and on the Butterfly Year Committee. We are continuing representations with the organisers of a scheme for the use of the Butterfly Year monies. The body now mainly responsible for the latter scheme is the World Wildlife Fund, and they have plans to finance projects in which we could perhaps participate. Further fund raising is also planned.

Having been released from the time wasting work associated with the passage of the 1981 Wildlife & Countryside Act, we have dealt very constructively with some items of major importance, especially the development of breeding releasing projects and the encouragement of improved methods of evaluating wildlife sites. We are particularly glad to report the appointment of two new officers, one of whom will co-ordinate the supply of stocks of insects for breeding while the other will organise the monitoring of the populations of insects following properly approved releasing experiments.

Publications and exhibits

We have produced our leaflet on butterfly gardens, and this has proved very popular at exhibitions and meetings of local societies. Issues 6 and 7 of Insect Conservation News were also produced, and favourable responses from readers, especially other conservation bodies, have continued to increase. Unfortunately, the proportion of AES Members who are subscribers remains regrettably low, due at least in part to the absence of a more attractive means of paying subscriptions. The possibility now exists, however, for part of the content of ICN to be published in the main AES Bulletin.

Our stand at the Society's Annual Exhibition was based on an individual site, Hounslow Heath in Middlesex, in order to illustrate our work for site protection and management. The success of this exhibit was enhanced by the welcome co-operation of members of the London Wildlife Trust in the construction and manning of the stand.

Field meetings

Due to poor attendance at field meetings, our Committee decided to suspend the general meetings programme pending the appointment of an officer who would be able to organise meetings in a way which might be more attractive to possible participants than has hitherto been possible. Our last general meeting was held at Hounslow Heath on 5th June and proved to be very interesting. On a more positive note, we have organised a new style of meeting which involves task work and the very promising start to this programme is reported under the next heading.

Individual site protection

As in previous years, Members are referred to Insect Conservation News for details of this, our major activity. Despite the general gloom over continuing site destruction, the sites with which we have been recently involved have fared quite well. At Borstal Marsh, Kent we gathered evidence and made representations in order to help prevent its conversion into a leisure centre, a plan which has now been withdrawn. Withdrawal was also the story at Feltham Marshalling Yards, Middlesex, where we had sought to modify development plans. Individual supporters have participated in successful protection measures at several sites, including some very rich Welsh meadow areas and Baddesley Common in Hampshire, the latter site being given special protection under the 1981 Act. On a very practical level, we have recently been organising a series of task work sessions at Ditchling Common, E. Sussex in order to restore a wetland site which had been damaged owing to inappropriate management by the local Council before we eventually secured restoration of the original conservation plan, agreed in the 1970s. This work has been a great success and we hope that similar projects will be possible in other areas where supporters live in sufficient numbers. Returning to action at the desk level, we were again reminded that the battle to save a site is never won for all time. At Walthamstow Marshes, one of the most interesting sites belongs not to the Lea Valley Regional Park Authority but to British Rail. This places it outside the agreements recently secured, and local naturalists urgently had to request representations from us and from other bodies when BR decided to dump waste ballast on the land. Fortunately, BR responded favourably, and the dumping will take place elsewhere.

Mention must also be made of a possible project in St. Austell, Cornwall, where we have been generously offered the management of an old quarry site by the owner, Mr J. Brown (7225). This will depend on the response of Members in the South-west, since local supporters would need to organise management work.

Finances

Excluding the Society's contribution to the Wildlife Link Committee, our expenses for the year ended 31st December 1982 were £128, of which £41 was met from AES funds.

David Lonsdale (4137)
Hon. Habitat Conservation Officer

REPORT OF THE EEG FOR 1982

This was our best year yet for Membership which reached a peak of 296 of whom 126 were AES members and 170 subscribers.

As usual four newsletters were produced and once again congratulations must go to Brian Morris for his very high standard of presentation. Brian also achieved two fertile hand pairings of the Madagascan Moon Moth (*Argema mittrei*) and made ova available to members. A full report together with photographs appeared in our Newsletter.

A meeting of the group took place at The London Butterfly House in May and this was well attended.

We were all pleased with the AES Exhibition and members put in a very impressive display of livestock and foodplants.

The Monthly Information sheet was a great success after a few teething troubles, which we hope to have ironed out by 1983 when it will cover the full twelve months of the year and will also carry advertisements for books, equipment etc.

C. J. Eschbacher
(Honorary Secretary)

REPORT OF THE INSECT BEHAVIOUR & ANT STUDY GROUP

Membership

1981 ended with a record membership of 39 and after all membership renewals were gathered in 1982 started with 30 members. Out of these 30 members, there were 27 AES members, two overseas AES members and one subscriber. An advert for the IBASG appeared in the March AES bulletin and this attracted five new members. The AES Annual Exhibition of 9th October 1982 attracted four new members thus making the end of 1982 read a total membership of 39.

Publications
A successful year ensued during which a full quota of bulletins were produced. A wide range of interesting articles were produced in conjunction with reports and diary notices. A three page membership list was produced which was designed to last for two years. No further publications were made mainly due to the success of the group's newsletter.

Meetings
1982 started with the Annual General Meeting which was held on 15th May to which four people attended. There were three field meetings. The first was held on 20th June 1982 at Hollingbourne where seven people attended. The third field meeting was held on 28th August 1982 at Oxon where just four people attended. The last meeting of 1982 was the AES Annual Exhibition. The IBASG had four tables and there were a total of eight people who helped at the group's tables all day and a large portion of the group's membership came along to the tables which made the day very successful.

In conclusion the future looks promising especially in the area of publications. Publications and meetings are now running very smoothly and it is hoped that the next report will show the membership side swelling.

M. M. Parsons
Secretary of the AESIBASG

BRITISH NATURAL HISTORY

A major new permanent exhibition under this title opened at the Natural History Museum on 26th May 1983.

Great Britain supports a rich diversity of plant and animal life in areas as different from one another as the rolling downland of the south and the pine-clad highlands of the north. Every visitor to this new permanent gallery will recognize most of the seven habitats represented. Some 2,000 species in the form of real specimens, models and photographs are included in the exhibition, arranged in scientific groups according to habitat. For this reason it is anticipated that the exhibition will be of particular interest to the amateur naturalist and those with enthusiasm for the British countryside.

An introductory sequence outlines how events in the past 2,000 years have determined which plants and animals live here. There are also sections on identification and conservation, and an index of all the specimens which appear in the exhibition. Some of the distribution maps will be more detailed and up-to-date than any yet published.

It is hoped that this exhibition will inform and encourage people to observe wildlife with the help of field guides and other publications on specific subjects. The final section of the exhibition acts as an

information point with suggestions for clubs and societies and further reading.

This permanent exhibition is situated on the top floor of the Museum and is of course free of charge. It covers an area of 350 square metres. The seven habitats covered are Urban and wasteland; Field and Downland; Heath, moor and highland; Estuaries, saltmarshes and sand dunes; Woodland; Freshwater, and Seashore.

Your editor visited the exhibition by invitation of the Museum and considers it to be well laid out. As might be expected from the example of recent displays and developments at the Museum it is eyecatching and informative. Very nearly too informative as the amount of information available is enormous. This is achieved by having no less than three indices available. The first of these lists species, in alphabetic sequence, and gives a number to each. Every species displayed bears its number and the second index, in numerical sequence, gives brief details of the species. Information is also given adjoining each displayed specimen. The final index is a card one giving references to books which should be consulted for further information. These range from simple keys and guides to comprehensive monographs.

The displays are laid out in a series of bays and that dealing with Woodland is shown in our illustration (Copyright of Natural History Museum). As can be seen it consists of both specimens and photographs of these in the habitat concerned. (The absence of insects in this particular one is due to their being behind the large 'Woodland' mural.)

Nearly a thousand species of insect are displayed and, since these represent most of the larger species, represents a very high (perhaps 60 - 70%) proportion of those likely to be more commonly met with. This is a very good effort indeed. One criticism that can be made is that there are a number of species that occur equally in two (or more) habitats and this could have been brought out more. Viewed as a whole the knowledgeable will at once notice the virtual absence of birds. This is deliberate as they are already well displayed in the Bird Pavilion on a lower floor and their inclusion could have resulted in the displays here being overcrowded.

An interesting feature for the initiation of the beginner is the use of a dichotomous key laid out so that one can try one's hand at identifying the unknown specimens. The answer is given at the end so that one can know if one's keying was correct! No cheating please.

An arresting visual display which is situated at the entrance to the displays draws attention to the appalling effects that habitat destruction and pollution can have on the number of species occupying an area.

Well worth visiting, either as a day out in London with all the family or when in London with the odd hour or two to spare.

Brian Gardiner

BOOK REVIEWS

The Willoughby Gardner Library — A collection of early printed books on natural history by John R. Kenyon. Published by the National Museum of Wales, Cardiff, A5; pp. 54; illustrated; Price £4.50 (+ 30p by post).

The usefulness of a catalogue such as this, which after all, is a printed and scholarly version of a library card index catalogue, became immediately apparent on a quick browse through it. Our eye alighted on the fact that there were two copies of Benjamin Wilke's 'Twelve new designs of English butterflies' and one was stated to have the page detailing means of forming a butterfly collection missing. Did that mean the other copy had it present? Yes, it did. Memory stirred; had not Mr Painter in his review of Eric Classey's reprint in the February Bulletin (*Antea* p.20) stated only one copy was known? Indeed he had, and on checking Dr Wilkinson's introduction to the reprint edition we find that this copy is in the British Museum (Natural History). So the publication of this catalogue has resulted in the discovery of another copy of a very very rare ephemeral item.

As stated in the foreword to this book 'A library is an integral part of a museum in that it provides an essential service for the curatorial staff in their research work . . . Yet it is probably true that few people outside the museum service are aware of the existence of such libraries let alone the extensive nature of their holdings . . .' This book has now made more than a few people aware of what is available in Cardiff. The Willoughby Gardner library is very small, but virtually all its holdings are of the early seminal historical works which form the basis of the transition from medieval folklore to true scientific study and on which present day knowledge is founded. To our mind of particular interest is the fact that quite a few of the works are present in several editions. For instance there are six editions of Pliny's Natural History, from a Venetian folio of 1481 to Bohn's six small volumes of 1855. We also noted several items not listed in Freeman.

This book is very well printed and laid out, in alphabet sequence of authors. There are some charming illustrations reproduced from mainly sixteenth century works. A criticism we should like to make is that we feel it would have been helpful and useful to have had the items numbered and to have made some detailed references to complimentary volumes that might be available in Cardiff, for the Willoughby Gardner library is the collection of books bequeathed to the University of Wales by the late Mr Gardner some thirty years ago and kept as an intact unit. It represents but a small part of their total holdings.

Brian O. C. Gardiner

The Wildlife of Britain and Europe, A Pocket Guide by Jeanette Harris. 192 pp. 700 species illustrated in colour. Published by Kingfisher Books Ltd. Price £3.95

This pocket guide was first published in 1981 as *'Nature Handbook'* and has been updated and renamed. The chapters cover mammals, birds, amphibians and reptiles, fishes, invertebrates and shell-bearing molluscs, trees, flowers and fungi. Obviously with such a range the various groups include only the commoner species. Each section has an introduction to the group being dealt with and this is followed by extremely good colour pictures of the species with a brief description of each. Insects being our main interest, twenty-one pages are devoted to them, nine being on the Lepidoptera; there are two pages of beetles, one of bugs, one on the Diptera, one on Neuroptera, one on Odonata and one on other insects which range from grasshoppers to thrips. It makes an excellent introduction to the observation of our flora and fauna and would be most welcome as a birthday present for any of our younger members.

PWC

The following reviews are all from *Habitat*.

Garden Life by Jennifer Owen. Published by Chatto & Windus (The Hogarth Press), price £8.95

A number of books have been published recently dealing with the subject of gardening specifically to encourage wildlife, but Jennifer Owen's book is interesting and unusual in that it deals with the amazing range of wildlife occurring naturally in a fairly conventional suburban garden. She has studied the wildlife in her own garden, in the outskirts of Leicester, for over a decade, by observation, trapping and identification. A conventional garden contains a large variety of habitats within a very small area: flower beds, vegetable plot, lawn, paths, shrubs and trees. This gives a large number of habitat edges or ecotones which are often richer in species than the habitats themselves (known as the 'edge effect'). In the author's garden, little more than a sixth of an acre, has been recorded 366 species of plants (including fungi), 50 species of birds, and over 100 species of insects. The book is an extremely readable month-by-month narrative, but it contains a great deal of practical advice and a full index, so that it can also be effectively used as a gardening manual.

Tropical Forests — the need for Action. Published by the Centre for World Development Action, 128 Buckingham Palace Road, London SW1W 9SH, price 35p per copy including postage.

This photo-leaflet focuses on the problems of the rapid rate of deforestation of the world's tropical rainforests and outlines their

economic and environmental value to the world economy. Worldwide policy changes are needed to restrict the depletion of this resource and a case study in Cameroon shows what steps can be taken on a local basis.

Bring Back Butterflies is the title of a ten page booklet issued as part of a campaign to halt the decline of the butterfly largely resulting from habitat loss. Readers are encouraged to involve themselves in ten simple ways to help bring butterflies back into their gardens and countryside and are provided with background information about their life cycle, habitat, requirements and conservation problems. Obtainable from Penlea Publications, 'Penlea', 20 Penrith Avenue, Whitefield M25 5UJ, price £1 including postage.

Butterflies of Worcester by Jack Green provides a local record about the species which occur or have occurred in Worcestershire. The emphasis is on the practical aspects of finding, identifying and observing these insects and the booklet is illustrated with eight colour plates showing 64 butterflies as they really appear. The text has been compiled to provide an easy reference work for the beginner, while at the same time including information for the more serious student. Well worth £2.80 plus 25p postage from WINC, The Lodge, Beacon Lane, Rednal, Birmingham B45 9XN.

A Naturalist's Guide to the A21 by John Feltwell. 'Wildlife Matters', Marlham, Henley Down, Catsfield, East Sussex TN33 9BN. Price 80p plus 12½p postage.

This is a nature trail with a difference — you can follow it from your car or stop off where you choose after short sections of a journey. Thumbnail sketch maps give details of interesting places for wildlife, picnic sites and toilets.

ERRATA TO DRAGONFLY LEAFLET

R. Kemp's information leaflet on Dragonflies is very good value and a useful addition to the bookshelf of an entomologist specialising in areas other than Odonata. It is published by the Worcestershire Nature Conservation Trust and contains 33 pages of information on status, life cycle and identification of all British species, illustrated by line drawings.

Inevitably, in such a budget production, there are a number of printing errors and I would like to offer the following list to enable AES members to correct their copies. These errors do not seriously spoil this pamphlet which has simple clear text and accurate information.

Page	Line	Is . . .	Should be . . .
7	19	veination	venation
	23, 25, 26	is	are
	5 from bottom	Corduligaster	Cordulegaster
10	2	vestigal	vestigial
	5	Sypetrum	Sympetrum
11	9	lamallae	lamellae
	10	trachae	tracheae
15	1	reclaimation	reclamation
18	19	Erythromma	Erythroma
(also p.21 line 9 and p.32 right column)			
20	12	scolicum	scoticum
22	6, 8, 10	Muller	Mueller
23	1	Muller	Mueller
22	7	caerulae	caerulea
27	20	quadrimaculato	quadrimaculata
	12 from bottom	Orthelrum	Orthetrum

Page	Key no.	Is . . .	Should be . . .
30	39	40 and 41	40 and 44
32	46	turquise	turquoise
34	57, 58	57, 58	Should be bracketed together as 57

The errors in the key (in particular) could be most confusing to a beginner.

Martin J. Wallace Smith (5794)

THE AGGREGATION OF *ANURIDA MARITIMA*: OBSERVATIONS AND A MODEL

Anurida maritima (Guérin) is a blue-black littoral collembolan about two mm long and one of the few species of insect to be found living in direct contact with the sea. It lacks the jumping organ or 'furca', usually associated with members of this order and for locomotion relies exclusively on a tripod gait; although to little avail when there is either wind or waves. Apparently, it feeds on a variety of organic detritus, having been noticed on barnacles and inside the mantle cavities of limpets (Imms, 1906, and personal observations). At high tide many individuals evade the strong currents by entering deep crevices in the rocks, and there they are able to withstand prolonged submersion by means of a thin film of air that is trapped around the body. For further details of the bionomics and anatomy of *Anurida*, see Imms (1906).

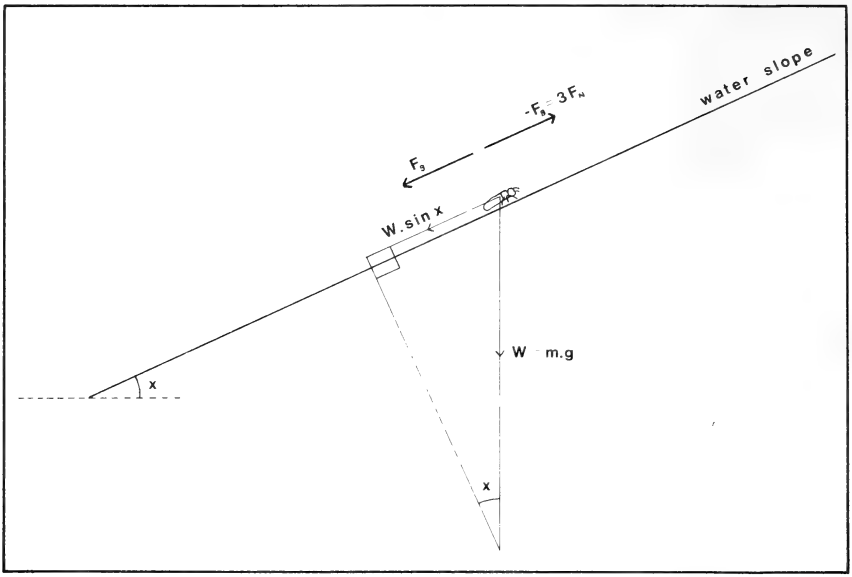

Fig. 1. Showing the relationship of the forces acting when an insect tries to walk up a water slope.

A curious phenomenon was observed while on a marine biology field course in Plymouth. Hundreds of *Anurida* could be seen clumped together on the surface of still rock pools, often in the company of a larger piece of floating debris. About fifty living specimens were taken back to our makeshift laboratory at Fort Bovisand and some simple experiments conducted to deduce the cause of this behaviour. After a week's improvised research, limited to only the crudest of apparatus, the following pieces of evidence were accumulated, which support the hypothesis that surface aggregations are merely fortuitous and caused by surface tension effects.

1. Individuals on the surface of completely still water can stand upright but make little locomotory progress (approx. 0.3cms $^{-1}$) even with the most frantic of paddling. Only the hydrophilic claw tips are actually submerged and judging from their shape, are better designed to help the animal cling to steep rocky surfaces rather than to row through water.
2. Individuals are unable to climb up the concave meniscus bordering a containing vessel and they also find themselves drifting toward any indentation on the water's surface (e.g. as caused by a floating object or by a wax rod plunged into the water).

3. Scattered specimens, whether dead or alive, will drift into each other if they come within a certain distance (approx. 1cm, but varying with size of insect).
4. Water containing the slightest surface ripple is sufficient to disband an aggregation. This explains their absence from the more exposed pools.
5. Members of a 'colony' make no visible attempt to remain together but relentlessly paddle in all directions.
6. Dimples caused by reflection of light can be seen around an individual or 'colony' which demarcate areas where the water surface slopes inward; thereby providing a vertical surface tension component to balance the downwardly acting weight.

A simple model can be constructed to show that the meniscal angle required to overcome the traction force of an *Anurida* is very small.

Consider the insect of mass m, trying to walk up a slope of angle x but making no progress either up or down the slope. In this condition of equilibrium, the component of the weight acting parallel to the slope exactly balances the forward thrust of the animal caused by fluid friction on the moving legs. By estimating the weight of a typical *Anurida* and by approximating the tarsal tips to cylinders moving through the water in a direction perpendicular to their longitudinal axis, it is possible to equate these two forces and obtain a rough value for x.

Hence:
density $= 1000\ \text{kg m}^{-3}$
length of body $= 0{\cdot}002$ m
breadth of body $= 0{\cdot}0005$ m
volume of body (approximating to a cylinder)
$= \pi \times (\text{radius})^2 \times \text{length}$
$= 3{\cdot}142 \times (0{\cdot}00025)^2 \times 0{\cdot}002$
$= 3{\cdot}93 \times 10^{-10}\ \text{m}^3$

Therefore:
mass $= 3{\cdot}93 \times 10^{7}$ kg
weight $= 3{\cdot}93 \times 10^{-6}$ N

The force due to gravity acting down the slope is given by (see Fig. 1):

$$F_g = W.\sin x$$
$$= (3{\cdot}93 \times 10^{-6}).\sin x \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The force acting normally on a cylinder of length L and radius d, moving through a fluid of viscosity v at velocity U is obtained from the formula (Holbertson, 1977):

$$F_N = \left(\frac{4.\pi.v}{\ln(2L/d) - 0{\cdot}5}\right) \times U \times L \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

For *Anurida*, the numerical values of the constants are:

$v = 1{\cdot}9 \times 10^{-3}$ N m^{-1}s^{-1} (Coeff. of Viscosity of seawater)

$L = 1 \times 10^{-4}$ m (length of tarsal tip)

$d = 0{\cdot}15 \times 10^{-4}$ m (radius of tarsal tip)

The tarsal velocity, U, can be calculated on the assumption of a maximal stepping frequency of 25 Hz (Alexander, 1977) and an observed stride length of about 1 mm. It is therefore $0{\cdot}001 \times 25 = 0{\cdot}025$ m s^{-1}.

Substituting the above figures in equation (2) gives a value for F_N of $2{\cdot}86 \times 10^{-8}$ N. Since three legs take part simultaneously in the active stroke, the overall force exerted by the water on the insect is $8{\cdot}57 \times 10^{-8}$ N. This must be equal in magnitude and opposite in direction to the slopeward component of weight during equilibrium, so that:

$(3{\cdot}93 \times 10^{-6}).\sin x = 8{\cdot}57 \times 10^{-8}$

i.e. $x = 1{\cdot}2$ degrees

Thus, theoretically, angles above 1·2 degrees are enough to cause slipping. In practice, however, using a more realistic value for the stepping frequency (i.e. about 10 Hz), this minimum theoretical angle becomes 0.5 degrees.

As the distance of closest approach has been observed to be about 1 cm, and assuming the vertical depression caused by a floating *Anurida* to be only 0·1 mm (a conservative estimate), this corresponds to an average angle of $\tan^{-1}(0{\cdot}01/1) = 0{\cdot}6$ degrees. Angles closer to the source of the dimple will be much greater than this owing to the asymptotically curved nature of the meniscus.

While this is only intended as a rough model, the results do seem to suggest that one need only invoke a passive phenomenon involving weight and fluid friction to explain the existence of aggregations on the surface of still water. For a more detailed analysis of surface tension effects in surface-dwelling insects see Baudoin (1955).

Despite these results, one cannot rule out the possibility that substances excreted by the collembolans play some part in surface locomotion (e.g. by lowering the surface tension). Also worth looking into is their habit of occasionally curling themselves into a banana-like shape and remaining motionless on the surface. The pattern of dimpling changes when they do this and the ventral tubular organ becomes wetted, suggesting that they are perhaps absorbing or secreting substances into the water, as is known to occur in *Podura aquatica* L., a freshwater species (Noble-Nesbitt, 1963).

A. P. Jackson (6122)

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INVERTEBRATE REMAINS FOUND IN BIRD PELLETS, WITH PARTICULAR REFERENCE TO THE COLEOPTERA

Many birds regularly regurgitate pellets composed of the indigestible fragments of bone, hair, seeds, and the chitin of the outer skeletons of invertebrates, which have accumulated in the gizzard until rejection becomes necessary. Pellets most commonly found are those of the Owls, but those of some of the Corvids, Raptors and the Dipper have been collected locally.

Recently it has been discovered that particularly on the North Derbyshire gritstone moors invertebrates form a higher proportion of the food items of some birds than was previously thought. From the evidence of pellet analysis, the larger or more numerous moorland species of beetle, for example, are an important seasonal food item.

Tawny Owl (*Strix aluco*). Pellet size, 40/60 × 20/25 mm. **Little Owl** (*Athene noctua*) Pellet size, 25/30 × 15/20 mm. Pellets from both birds contain many small mammal remains but also a smaller number of the larger beetles, usually *Geotrupes* species, but occasionally remains of *Carabus problematicus* Herbst, or *C. violaceus* L. One Tawny owl pellet was found which contained two of the distinctively horned pro-notums of *Typhaeus typhoeus* L., a fairly uncommon beetle in this area.

Crow. *(Corvus carone).* Pellet size, 40/45 × 20/25 mm. These birds seem to have a wider taste in invertebrates than the Owls, one pellet actually seen deposited was composed almost completely of such remains, and contained the following:—

Polychaeta.
Several earthworm chaeta.....(1)
Lepidoptera.
One matching pair of larval mandibles.....(1)
Coleoptera.
Carabus problematicus Herbst.
Fragments of one pair of elytra.....(1)

Carabus violaceus L.
Fragments of one pair of elytra.....(1)
Pterostichus niger Schaller
Complete head and parts of pronotum.....(1)
Staphylinidae species.
One complete abdomen.....(1)
Geotrupes species.
Eighteen heads and numerous elytra pieces.....(18)
Aphodius contaminatus. Herbst.
Apices of 115 elytron and numerous heads.....(58)
Aphodius species
One complete elytra.....(1)
Plus the elytra of three other unidentified species.....(3)
Diptera.
Two complete heads of same species.....(2)

The rest of the pellet was made up of numerous *Juncus* seeds, small grit fragments, and sand.

Kestrel (*Falco tinnunculus*). Pellet size, 30/35 × 15/20 mm. Kestrel pellets usually contain some invertebrate remains, but those found on moorland in summer can contain up to twenty *Geotrupes* together with the occasional *Carabus* and Elaterid beetles. Earthworm chaeta are sometimes numerous.

Sparrowhawk (*Accipiter nusus*). Pellet size, 20/40 × 12/17 mm. These pellets are made up predominantly of mammalian remains, but on two occasions young Sparrowhawks have been seen to break open dung masses and feed on the inhabitants which were mainly *Aphodius contaminatus* Herbst.

Dipper (*Cinclus cinclus*). Pellet size, 16/17 × 6/7 mm. The pellets of the Dipper have been more extensively collected than those mentioned above. Over a period of four years over thirty pellets have been found on the riverside stones of the River Alport in the Derbyshire Peak District. Although the Dipper has never been proved to breed on this river it is searched at regular intervals throughout the year. Pellets, however, have only been found between July and November, the largest number in September.

This apparent restriction to summer and autumn may be due to either spring and winter floods washing away any pellets, or to the Dippers (which do breed on the nearby River Ashop) extending their feeding range up the Alport to supplement their food supplies during the breeding season.

This theory is to some extent supported by the numerous sightings of family parties feeding on the river in September and October.

The content of the pellets varies according to the season, those found in summer contain more of the remains of those invertebrates commonly found on the riverside stones during this period; those found in autumn contain a larger proportion of aquatic species. Beetles account for over a quarter of all the identified items, and allowing for the fragments too small to identify and the variation in the prey size, it would seem that the coleoptera are an important source of food for the Dipper on this particular river in late summer and autumn.

Most bird books infer that the Dipper feeds exclusively on aquatic creatures, but the following list shows that as nearly 17% of the items taken are non-aquatic, it is also a successful 'Picker-up of unconsidered trifles'.

Crustacea.
Gammarus pulex L.
Numerous small fragments.....(33)
Dermaptera.
Velia caprai Tamanini.
Complete heads and legs.....(42)
Trichoptera.
Rhyacophila species.
Head capsules.....(76)
Agapetus species.
Head capsules.....(5)
Hydropsyche species.
Head capsules.....(67)
Sericostomatidae species.
Head capsules.....(2)
Unidentified Caddis cases made of grit.....(21)
Lepidoptera.
One pair of matched mandibles.....(1)
Coleoptera.
Nebria species
Large fragments of elytra.....(2)
Notiophilus aquaticus L.
Complete head and one elytra.....(1)
Haliplus species.
One almost complete beetle and another elytra.....(2)
Hydroporus palustris L.
Two heads and elytra fragments.....(2)
Oreodytes davisi Curtis.
Complete heads and large pieces of elytra.....(14)
Agabus guttatus Paykull.
One almost complete elytra.....(1)

Anacaena globulus Paykull.
Elytra fragments.....(4)
Geodromicus nigrita Muller.
Heads and one abdomen.....(4)
Othius myrmecophilus Kiesenwetter.
Head with complete antennae.....(1)
Omallinae species.
Four different heads.....(4)
Aphodius contaminatus Herbst.
Complete heads and elytra fragments.....(15)
Elmis aenea Muller.
One larvae and numerous almost complete beetles.....(22)
Hypnoidus riparius Fabricius.
One almost complete pronotum.....(1)
Athous hirtus Herbst.
Large pieces of elytra and pronotum.....(1)
Phyllobius argentatus L.
Complete heads and numerous elytra fragments.....(16)
Strophosomus melanogrammus Forster.
One head and two elytra.....(1)
Strophosomus sus Stephens.
One head and pronotum.....(1)
Hymenoptera.
Andrena species.
One wing and sting.....(1)
Lasius niger
Two heads.....(2)
Diptera.
One head of each five different species.....(5)

Vast numbers of Plecoptera and Ephemeroptera larvae are present in the river, and although Dippers have been seen to snatch a passing adult Mayfly from the air, no remains of adults or larvae of either order have been identified in their pellets.

In conclusion, the identification of invertebrate fragments to be found in some bird pellets can be an absorbing pastime, leading as it does into many fascinating byways of natural history. It can provide an unending source of interesting facts, speculations, and sometimes frustrations, but is never short on surprises.

E. J. Smith (6580)

NOTES AND OBSERVATIONS

Red Admiral in early March. — On Saturday 5th March, 1983 whilst giving my lawns their first cut of the season, my wife and I noticed a butterfly flying around the next door neighbour's house. When the insect settled, we were amazed to observe it to be a fairly fresh specimen of the *Vanessa atalanta* L.

The insect continued to fly from house to house and settled frequently sunning itself on the walls and windowsills of both houses, and it remained in the area for approximately one hour. No attempt was made to capture the insect although this would have been a very easy thing to do.

The weather was warm and sunny and I checked the air temperature which was 58°F (15°C) but none of the other normal hibernating species of butterfly were to be seen on the wing.

I have always believed from the text books that the Red Admiral does not hibernate in this country and that there are very few records of this having happened, but the 1982/83 winter in the Reading area has been extremely mild and this particular specimen may have been able to survive.

I wonder if any other members have recorded similar early sightings of hibernating *atalanta* this year?

Barry Ofield (4825)

A note on Swallowtail pupae — Further to P. W. Cribb's note on pupal colouration in the Swallowtail (*Papilio machaon* L.) in the February Bulletin, may I add a small observation. Recently I reared three larvae together in a single cage. For pupation purposes I pinned in the cage several dried reed stems and fortunately all three spun up on these 'natural' fixtures. One pupa was buff and dark brown (a fair match on the dead stem). One was pale green with darker green markings, and the other was pink with dark brown markings. I know this is not a large enough number to draw any firm conclusions, but food for thought maybe. Incidentally, all the larvae were fed up on Garden Angelica (*Angelica archangelica*).

D. Stokes (7630)

Papilio machaon bigenerata. — My notes (Vol. 42 pp. 36-37) on the third generation of the Swallowtail bred from a female taken in Var, France has elicited a reply from our member Basil Yates-Smith (7259) who has kindly given me observations of the butterfly on the wing in France as follows:—

16th May, 31st May, 11th June, 30th June, 8th July, 7th August and 20th August.

My emergences in September (as late as the 9th) indicate that at least in its southern habitats the butterfly is on the wing from April until September and perhaps might be better named *'trigenerata'*. I have no information on its life history from the warmest part of its range but there it might perhaps aestivate rather than hibernate or be continuously brooded.

P. W. Cribb (2270)

A note on Antheraea harti — In the recently published third edition of the Society's *Silkmoth Rearer's Handbook*, it is stated that the moth *Antheraea harti* Moore in cross pairings with *A. pernyi* G-M, is thought to be determined by a simple recessive gene. Intermediate forms are known to occur.

Last year at the Wigan Entomological Society Exhibition I obtained a small number of larvae of *A. harti* from which moths of both *pernyi* and *harti* phenotypes were bred.

A pairing between individuals of type *harti* yielded a brood of 28 imagines of which 19 were *harti* and nine were of type *pernyi*.

Superficially, *harti* differs from *pernyi* in one major respect, that being the replacement of the sandy colour of *pernyi* by the dark chocolate pigment of *harti*. Each of the wings have an orange-brown marginal fringe reminiscent of the *pernyi* ground colour. I have bred a few individuals of *harti* in which the area beyond the submarginal line of each wing was suffused with light brown scales. The intensity of the suffusion is either constant or decreases with increasing distance from the margin and may be due to diffusion of the fringe pigmentation. The ocelli of both forms are always identical.

These results suggest that in crosses with *pernyi*, *harti* is determined by a single gene dominant in effect. In particular the first pair of moths of type *harti* must both have been heterozygous for *pernyi*, since *pernyi* appeared in the following generation. The ratio of 19:9 does not deviate significantly from the expected ratio of 21:7 ($X^2 = 0.76$).

No test cross was obtained, from amongst *pernyi* which had segregated from parents of type *harti*.

S. A. Brassett (7685)

Flies and the prey of Mantids — I recently made a trip to North Africa in order to study some of the insects there. While there I observed a strange behavioural activity of some small flies in the presence of a very large mantis.

Every time the mantis captured its prey, a swarm of small flies which had been lurking expectantly nearby converged upon the mantis' prey,

waited until the mantis had cut through the chitin of the prey and then proceeded to suck the juices of the prey, skilfully avoiding the mandibles of the mantis. Has this pattern of behaviour been recorded previously?

J. Daniels

Yet another new dealer — In these times of such economic distress it really is encouraging to see the enterprise of people setting themselves up in business. In the last issue we reported on an antiquarian bookseller. In this issue we are pleased to draw members attention to the other end of the scale. A specialist new publications dealer. This is Bio-Science Supplies of 4 Long Mill North, Wednesfield, Wolverhampton, W. Midlands WV11 1JD. In spite of their name their speciality is the lower-priced books and pamphlets with a great emphasis on keys to identification. These last are published by so many different organisations that to have such a collection available in the one catalogue will be a great boon to both teachers and students, not to mention the entomologist wishing to diversify. Their coverage includes ordnance survey maps and on the biological side both the entomologist and the microscopist are well catered for. We wish them well.

Editor.

To those interested in Coppers — As a supplementary number of 59 pages and 2 colour plates the *Nachrichter des entomologischen Vereins Apollo* has published a fine well illustrated paper on the genus *Thersamonia*, by Klaus Schurian and Peter Hofmann.

The paper does not claim to be a general revision of the group but goes thoroughly into the present knowledge of their subspeciation, distribution and biology with the intention that this summarising of present knowledge identifies the gaps and will stimulate new research in the field. Although the *Thersamonia* are mainly of Eastern Mediterranean distribution (they go in fact much further East as well) more and more holidaymakers are coming across them as they seek escape from the nearer and overcrowded holiday centres.

Editor.

And now for the next handbook — The Silkmoth Rearer's Handbook, now in its third edition, has been the Society's most successful publication and has been in print for forty years. However, by studying dealers' lists and private advertisements over the past two or three years it has become apparent that a great deal of live material of insects other than Saturniidae are now available and becoming increasingly popular. In particular we note the genus *Papilio* and numerous members of the Sphingidae are now freely obtainable and much sought after and reared. Whereas in the past Saturniidae formed 80 - 90% of livestock available it

has now sunk to perhaps 15 - 20%. Increasingly, too, other orders (Coleoptera, Arachnidae) are becoming more popular. It seems to me that we now require a 'Handbook' along similar lines to deal with some or all of these other species, although in many respects the remarks made in the introductory chapters of the Silkmoth Handbook can be taken to apply to moths and caterpillars generally. Butterflies and other orders do of course require different treatments. Should any members (or indeed non-members who chance to read this) feel that such a publication would be useful, or have any suggestions about the matter, then the editor would be pleased to hear from them.

Sudanese butterflies on the edge of the Sahara — A Comment. — Several interesting points emerge from Dr McCleery's article under this title (1982, *Bull. Amat. Ent. Soc.*, 41:181 - 186). In the first place the Passiflora species, with a tomato-sized fruit, is almost certainly a species of *Adenia*, described by Lady Jex-Blake as 'a largely represented genus of plants, often climbing; many are prickly, some grow from huge football-like tubers, and nearly all are in the lower hot countries' (1948, *Some Wild Flowers of Kenya*, Highway Press, Nairobi, Longmans, Green & Co.); the fruit is said to be poisonous. These are well known as food-plants of the Acraeidae, but *A. encedon*, which usually feeds on *Commelina* spp. (Commelinaceae) is not recorded as feeding on any Passifloraceae. Nor has it been recorded hitherto as a foodplant of *D. chrysippus*, which usually feeds on *Calotropis procera* and other Asclepiadaceae, normally inhabitants of arid country, and I am reluctant to include it in my list in the absence of further confirmation. Incidentally the form *dorippus alcippus* is usually known as f. *albinus* Lanz. I have bred all four forms in a single brood.

Several papers have recently stressed the lack of any connection between the proportion of the various morphs of the model, *D. chrysippus* and the mimic, *H. misippus*, and I do not think that the increase in the various forms of *misippus* can be ascribed to mimetic adaptation, this is usually a far slower process.

Both groups of *Colotis*, the one feeding on Capparidaceae and the other on *Salvadora* (Salvadoraceae), are included in the list of species present and it would be interesting to know if the difference in foodplants persists in the Sudan, *Salvadora* is not usually uncommon in arid country. The presence of two subspecies of *C. danae* — *eupompe* Klug and *pseudacaste* Btlr, — is interesting; Carcasson in his *Handguide to the Butterflies of Africa* (Collins, 1981) treats *eupompe* as a Sudanese race and *pseudacaste* as native to Tanzania, Kenya, Uganda and N. E. Zaire. There seems to be some error in recording *C. eucharis evarne* Klug and *C. evarne* Talbot: what is the latter?

D. G. Sevastopulo

OBSERVATIONS ON THE SPECKLED WOOD IN JERSEY

Each year I endeavour to study, more in depth, the habits and behaviour of one species of butterfly. In 1982 I devoted time to the Speckled Wood *Parage aegeria L.* and in particular in Jersey.

It is well known that there are two sub-species, *P.aegeria aegeria* L., the typical sub-species which occurs in S.W. Europe, and *P.aegeria tircis* Butler (formerly *egerides*) which is found in Central and Northern Europe including Great Britain. The former has fulvous or tawny spots similar in colour to the Wall butterfly *Lasiommata megera* L. while the latter has spots varying from white to pale yellow.

According to Higgins and Riley (1970) the distribution areas of the two colour forms are not clearly defined and late broods of *tircis* in the south of its range in Britain tend to incline towards typical *aegeria*.

Halliwell (1933) remarks that Jersey specimens are not so deeply coloured as those from South Europe but there is no doubt that they are darker than the English type.

It was this remark that prompted me to see for myself, on a recent visit to Jersey. Unfortunately it was not at the best time (Sept. 14th-23rd) in view of Higgins and Riley's remarks regarding late broods.

The Speckled Wood is one of the commonest butterflies in Jersey (certainly in September) and is described by Long (1970) as 'abundant from April to October in all the Channel Islands'. Much to my surprise the butterfly was to be found flying in all kinds of situations, in gardens in St. Helier and in some instances in the streets of the town, in full sunlight, quite unlike its habits in England. The only place where it appeared to favour shady pathways was in the Howard Davis Park in St. Helier, but even there it was frequently seen in the open. It was here that I was able to examine a few more closely and found at least three that had darker spots than on the mainland, but in no way resembling the southern form which I have seen in S.W. France. Like the Jersey race the southern sub-species tends to fly in more open situations, for example, by the roadside and along sunny pathways similar in habit to *L.megera*. The furthest north I have seen it was at Châteaubriant (Loire Atlantique).

In Hampshire our sub-species is certainly more local. To mention an extreme case, at Stockbridge Down I have found it in one very small area where a narrow shady path, about 15 yards long, runs through a thicket of downland shrubs; privet, whitebeam, yew etc. Year by year it is possible to find it in this spot with no sign of it in the immediate open surroundings.

Other butterflies noted in Jersey this September were:— *Vanessa atalanta, Cynthia cardui, Coenonympha pamphilus, Celastrina argiolus, Lycaena phlaeas, Artogeia rapae* and the moth *Macroglossum stellatarum*.

B. R. Stallwood (1547)

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FRANCE 1980

(Continued from page 95)

We also caught some moths; the Pale Shoulder, *Tarache lucida*, Silver Y, *Plusia gamma*; Lime-speck Pug, *Eupithecia intricata*; many male Oak Eggars, *Lasiocampa quercus* searching for mates; Hummingbird Hawk moths, *Macroglossum stellatarum*; and two Pyralidae, *Nomophila noctuella* and one which looks like *Platytes alpinellus* and numerous Crambids.

We also again found large bush crickets and numerous brightly coloured grasshoppers. The brightly coloured underwings certainly made them virtually impossible to locate. When following a bright colour which suddenly disappears, the eye and brain are totally fooled. Amongst the grasshoppers we found some with hindwings of pale blue throughout. Most had a dark sub-marginal band but with the rest of the hindwing blue, red or straw coloured. Can anyone suggest a book that would enable me to identify these insects? There were also large dark winged bumble bees with shiny blue-black bodies, digger wasps, colonial wasps making paper nests between flower heads, two species of mantid, two species of web spiders with dramatic shape and colouring plus the true tarantula. We even found a scorpion under a stone which totally fascinated my young son. He kept going back to watch it wag its tail at him. We saw large ugly flies which seemed to turn to watch you as you walked past. I now believe these were Robber flies of the family Asilidae. Scorpion flies and ant lions were also seen and a large lizard was sighted in some bushes.

As it was so hot during the day we found it best to sunbathe in the morning and take the family to a patch of trees in the afternoon. It appeared that many French families did the same. From the trees my friend and I, and often our children, made forays into the surrounding fields. This behaviour soon taught us why the song calls us 'Mad Dogs' for going out in the midday sun but it was either that or do without our specimens. On one of our excursions we found a large lake with a huge flock of flamingos upon it which gave us some pleasure.

Eventually we had to return home. We made an overnight stop at Pont de Vaux on the Soane where we saw Swallowtails, *Papilio machaon*; Clouded yellow, *Colias crocea* (both forms of the female); Pale and Berger's Clouded yellows *Colias hyale* and *C.australis*; Green-veined white, *Pieris napi*; Small white, *Pieris rapae*; Brimstone, *Gonepteryx rhamni*; Gatekeeper or Southern Gatekeeper but very tatty; Common Blue, *Polyommatus icarus*; Small heath, *Coenonympha pamphilus*; Speckled Wood, *Pararge aegeria tircis*; Peacock, *Inachis io*; Red Admiral, *Vanessa atalanta*; Painted Lady, *Vanessa cardui*; Mazarine blue, *Cyanaris semiargus*; and a Jersey Tiger, *Euplagia quadripunctaria*.

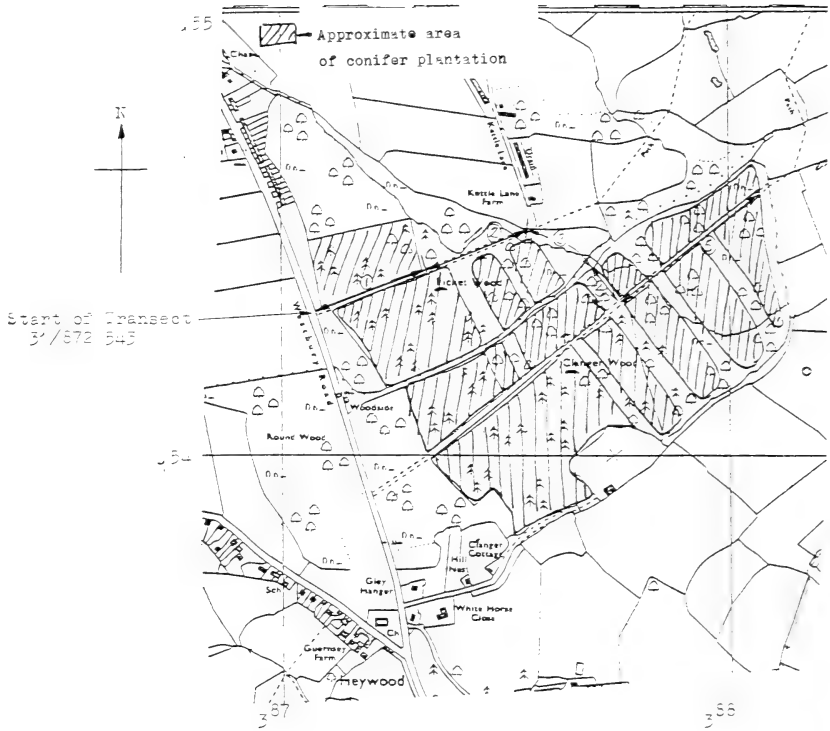
At Ailly sur Noye we again found the field crawling with Chalkhill blues, *Lysandra coridon*, many in cop. We also found a Small white trying its luck with a Wood White, *Leptidea sinapis*, an interesting cross if it had succeeded; Clouded yellow, *Colias crocea* and some of the Pale clouded yellows either *hyale*, *australis* or both; Wall butterfly, *Lasiommata megera*; and the Painted Lady, *Vanessa cardui*. We also caught the Straw belle, *Aspitates gilvaria*.

We did not stay long at Ailly sur Noye as the French fishermen were blockading the French ports so we made our way to Belgium. In fact it was quite an eventful trip. It started with my daughter getting Chicken Pox. It finished with my son in a beautiful array of spots for the return journey home and my friend's daughter breaking her collar bone on the return journey. We curtailed our holiday by a day and queued all night at Zeebrugge in Belgium as my friend wanted to be certain of returning in time for his return to work. We then found that the blockade was lifted as soon as we got home anyway (perhaps it was only meant to inconvenience us!). Still, I did manage to catch a Mouse, *Amphipyra tragopoginis*; Large Yellow Underwing, *Triphaena pronuba*; and Square Spot Rustic, *Amathes xanthographa* whilst waiting in the queue at Zeebrugge. Actually it is strange how you soon get to know people when catching moths at their headlamps at two or three in the morning. I quite enjoyed that night and early morning, but I nearly fell asleep on the M2 later.

Roger A. Wright (6598)

APHORISH

Most birds are now protected by law
Many birds eat insects
Cats chase birds
So keep a cat
And feed it sparingly



PICKET WOOD — WESTBURY — WILTSHIRE
MAP No. 1

Transect Section 1	253 paces.
Transect Section 2	377 paces.
Transect Section 3	181 paces.
Transect Section 4	146 paces.
Transect Section 5	455 paces.
	1412

BUTTERFLIES OF PICKET WOOD

Introduction

Picket Wood is part of an ancient oak woodland of 160 acres adjacent to the A350 Trowbridge to Westbury road near Yarnbrook and Heywood.

Management

The wood has been partially cleared at various times and replanted with conifers which now vary from 2′ to 25′ in height, but an unusual feature of the clearances was that 'belts' of the oak woodland were left thus creating initially open grassy flowery areas within the wood and a considerable length of apparent woodland edge type habitat along these belts.

The rides have been regularly managed to keep them wide and clear and this has encouraged a considerable ground flora to become established. During the last five years, vegetation and saplings of ash, birch, sallow, blackthorn etc. have been cleared by hand from around the young conifers in the Autumn and this appears to have encouraged the growth of the typical woodland plants of the forest floor i.e. bluebell, primrose, violet, anemone etc.

Butterfly Monitoring Scheme

Since May 1978 I have been studying the butterflies in the wood as per the Butterfly Monitoring Scheme devised by the Institute of Terrestrial Ecology at Monks Wood Experimental Station in Cambridgeshire. The scheme is a method of assessing the changes in abundance of butterflies in their locality and consists of walking a fixed route called a transect, through a habitat at least once a week during the season from April to September inclusive. i.e. 26 weeks, and recording any butterflies seen along the transect. Certain weather conditions must prevail — preferably calm, warm and sunny, and at the end of the season the weekly totals are added together for each species to give the seasons total, called the Index of Abundance for the species. If more than one transect is walked in a week then the average of the numbers seen is taken and if some weeks are missed due to poor weather, illness, holidays, etc. the weekly count can sometimes be estimated from other weeks totals and these figures are shown in brackets.

The Transect

Map No. 1 shows the location of the transect within the wood which follows either the rides or paths. It is sub-divided into five sections as detailed.

Recording and Tables

Table 1 shows observations made on the transect on 18th July 1981 which was in week 16.

BUTTERFLY CENSUS

Year 1-2	1981	Date 3-5	18-7	Recorder 6-8	M. Fuller
9-11		Site Name 12-17	Picket Wood, Nr. Westbury		18-19
Start Time 20-23	12.35	End Temp. °C 24-26	22	% Sun 27-28	100	End Wind Speed 29	1

	30-32	33-35	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78-80
SECTION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Brimstone	54																
Common Blue	106	0	1	0	0	0											1
Green-veined white	99																
Hedge brown	76	0	1	3	0	3											7
Large Skipper	88	0	0	1	0	0											1
Large White	98	0	0	1	0	0											1
Meadow Brown	75	5	9	3	0	3											20
Orange Tip	4																
Peacock	84																
Red Admiral	122																
Ringlet	8	12	8	16	0	27											63
Small Copper	68																
Small Heath	29																
Small Skipper	120	16	6	5	0	14											41
Small tortoiseshell	2																
Small white	100	0	0	0	1	0											1
Wall	94																•
Marbled White	20	6	9	0	15												50
Silver-washed fritillary	1	0	2	0	0												3
Essex Skipper		1	0	0	0	1											2
White Admiral		1	1	0	0	1											3
Speckled Wood		0	1	0	0	0											1
Comma		0	0	0	0	1											1
Purple Hair		0	5	1	6	5	(Evening visit 6.10-7.30pm.)										17
Totals		56	38	41	7	70											212
SECTION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
SUNSHINE																	

NOTES: PLEASE TOTAL EACH SQUARE

TABLE 1

Picket Wood has proved to be an exceptional site, 36 species having been recorded since I first started in May 1978. The list of species is given in Table 2 together with the larval foodplant and the Annual Index of Abundance for each species, separated into the Spring and Autumn flights, and generations where these are distinct.

Nineteen of the species are common and widespread throughout southern England and a further two are immigrants from Europe which could turn up anywhere in Britain, but it is the number of less common species in this relatively small habitat which makes the wood so special. Also there are species which are not usually associated with woodland but rather grassland or downland such as Marbled white, Brown argus, Dark green fritillary, Marsh fritillary and, arguably, the Dingy, Grizzled, and Essex skippers.

Where there is a dash in the tables, I have no records because I did not start recording until the end of May 1978. A question mark indicates that I was unable to distinguish between very similar species when on the wing i.e. Small and Green-veined whites, Silver-washed and Dark green fritillaries and the Pearl-bordered and the Small pearl-bordered fritillaries and these have been grouped together as 'White', 'Large fritillary' and 'Small fritillary' respectively.

The Purple hairstreak is a special case in that the main flight period around the tops of the oak trees appears to occur in the early evening. Only the occasional sighting is made during the day and yet in the evening the species is widespread and numerous throughout the wood although rarely descending from the oak trees. It was only in 1981 in July that I started evening transects to monitor this species.

Results and Trends so far

Sufficient data is now available for study and interpretation and it is immediately apparent that over the five years 1978-82 a main influence on the abundance of species has been the weather.

In 1981 the Spring butterflies were generally well down in numbers as one might expect remembering the very poor weather, whereas the Summer and Autumn species were generally well up on the 1980 levels with the good weather. Due to the superb weather we enjoyed earlier that year, the numbers of butterflies recorded in the wood has been the highest ever and some species have emerged as much as three weeks earlier than usual. This is in spite of one of the longest, coldest Winters ever and it has been thought for some time that cool, damp conditions are far more harmful to hibernating creatures than very cold, relatively dry conditions and this appears to have been the case this year. What is surprising is that even during 1981's very poor Spring and early Summer, sufficient females mated and laid eggs to produce the large numbers of that year's species, helped to develop of course by the warm, dry Spring. So it may be that the important time for the species weatherwise is during the growing and development stages, i.e. the larval and pupal stages.

Species	Larval food plant	Annual Index of Abundance				
		1978	1979	1980	1981	1982
Common & Widespread						
1. Small tortoiseshell	Nettle	0-40	10-54	11-85	7-19	1½-180
2. Brimstone	Buckthorn	0-1	10-1	4-3	7-1	16-19
3. Peacock	Nettle	0-53	35-33	25-40	19½-33	45½-108
4. Comma	Nettle, Elm	0-0.1	0-0-0	1½-6-1½	2-5-1	7½-17-11
5. Speckled wood	'Grass'	88	72	94	163	99
6. Small white	Cabbage	?	?	?-9	?-16	15-40
7. Green-veined-white	Hedge garlic	?	?	7-17	6-24	5-43
'White'		0-89	59-56	34-48	26-64	35-114
8. Large white	Cabbage	10-26	37-2	7-6	14-5	9½-16
9. Orange tip	Jack-by-the-hedge	—	17	2	6	2½
0. Holly blue	Holly, Ivy	0-0	2-2	0-0	1-0	0-1
1. Small heath	'Grass'	104	83	69	24	39
2. Small copper	Dock, Sorrel	0-16	3-54	2-34	1-42	11½-63
3. Large skipper	'Grass'	47	38	49	19	51
4. Common blue	Bird's-foot trefoil	2-3	2-18	9-27	6-46½	47-88
5. Meadow brown	'Grass'	117	109	81	104	213
6. Small skipper	'Grass'	381	336	324	402	321
7. Ringlet	'Grass'	57	95	130	159	236
8. Hedge brown	'Grass'	524	707	247	559	410
9. Wall	'Grass'	0-1	0-1	0-4	1-6	1½-1
Immigrants						
0. Red Admiral	Nettle	0-1	0-0	0-5	0-2	2½-10
1. Painted Lady	Thistle	0-0	0-0	2-5	0-0	3½-2
Less Common						
2. Grizzled skipper	Wild strawberry	66+	57	46	32½	78
3. Duke of Burgundy	Cowslip, Primrose	23+	8	20	15	33½
4. Dingy skipper	Bird's-foot trefoil	4	10	15	7	37
5. Green hairstreak	Various	4	4	5	0	1½
6. Brown argus	Hemlock storksbill	0-0	0-1	0-11	2-32½	2-38
7. Marsh fritillary	Scabious, Honeysuckle	19	11	5	1	5
8. Pearl-bordered fritillary	Violet	?	?	40	23	?
9. Small bordered fritillary	Violet	?	?	44	54	?
'Small fritillary'	Violet	45+	47	86	82	104
0. Marbled white	'Grass'	148	141	114	127	185
1. Essex skipper	'Grass'	?	1	8	10	2
2. White Admiral	Honeysuckle	4	4	7	9	32
3. Purple hairstreak	Oak	?	?	?	244	305
4. White-letter hairstreak	Wych Elm, Elm	1	0	0	0	0
5. Silver-washed fritillary	Violet	?	?	21	31	64
6. Dark Green fritillary	Violet	?	?	7	0	1
'Large fritillary'	Violet	55	102	28	31	65

TABLE 2

Table 3 shows the accumulative totals of all butterflies (excl. Purple hairstreaks) recorded at the quarter periods of the season and it is clear that 1982, The Butterfly Year, has been the best so far and it will probably be shown to be the same story nationally once the results from the other hundred or so sites within the monitoring scheme are processed at Monks Wood by the I.T.E. and published later in the year.

Year	Accumulative Recorded at Week Number				Weather
	6	13	18	26	
1979	60	438	1420	2285	Generally Good.
1980	68	425	1017	1675	Good Spring, Poor Autumn.
1981	44	297	1141	2058	Poor Spring, Good Autumn.
1982	115	798	2181	2752	Very Good Spring, Average Autumn.

Table 3

The Species

The accompanying graphs show the fluctuations in the Index of Abundance over the five year study period, they are grouped into species that are on the wing at the same time as far as possible rather than in family groups, since this shows better how the weather affects the species.

Single Brooded Spring Species

Grizzled skipper (*Pyrgus malvae* L.)
A steady decline until 1982 when the Index value was the highest ever recorded.

Duke of Burgundy (*Hamearis lucina* L.)
A record Index value after four years of minor fluctuations.

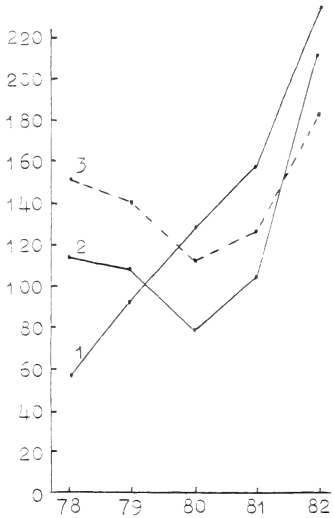
Dingy skipper (*Erynnis tages* L.)
A steady increase until the downturn in 1981 with the 1982 Index value showing a large increase.

Green hairstreak (*Callophrys rubi* L.)
Low numbers in the wood and very local, none seen in 1981 only two specimens seen in 1982.

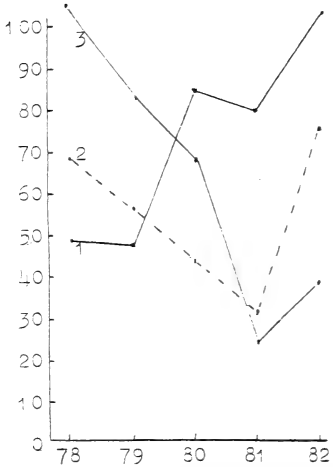
Orange-tip (*Anthocaris cardamines* L.)
Low numbers and usually only patrolling males are seen along the rides, eggs are often seen on Ladies Smock in June.

Marsh fritillary (*Euphydryas aurinia* Rott.)
A steady decline from 1978 when it was widespread although not plentiful, throughout the wood, until 1981 when only one specimen was seen. A recovery in 1982 when six were seen on 3rd June and four on the 6th. Many were reported from Pewsey Down NNR, the ranges and at Westbury White Horse.

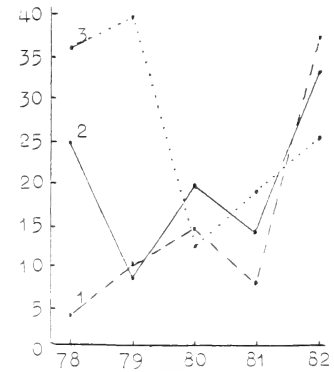
Graphs of Index of Abundance for the five years 1978 - 1982.



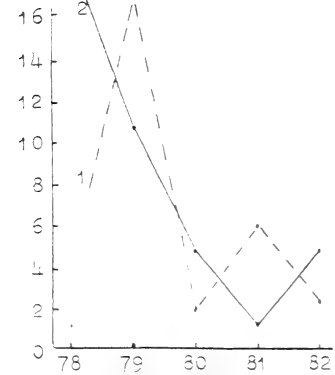
1. Ringlet.
2. Meadow Brown.
3. Marbled White.



1. "Small"Fritillary.
2. Grizzled Skipper.
3. Small Heath.



1.Dingy Skipper.
2.Duke of Burgundy.
3.Large White.



1.Orange Tip.
2.Marsh Fritillary.

Pearl-bordered and Small Pearl-bordered fritillaries (*Clossiana euphrosyne* L. & *C. selene* L.)
These two species are almost impossible to identify from each other when on the wing and so the Index Value is a combined one for the two species. The Index Value has doubled since 1979 with a fallback in 1981 as with the other Spring species.

Small heath (*Coenonympha pamphilus* L.)
This little butterfly is included in this section although it is by no means certain whether it is single-brooded with a long emergence period or a double-brooded species with only a partial second brood. The main flight period is during June and the Index Values have indicated a sharp decline since 1978. The August/Sept. Index Values have remained consistently low at two or three until 1982 when the value rose to six. Overall for 1982 the Index indicates a small recovery.

Single Brooded Summer Species

Large skipper (*Ochlodes venata* Brem. and Grey)
1982 showed a return to its 1980 level after the big decline in 1981.

Small and Essex skippers (*Thymelicus sylvestris* Poda and *T. lineola* Ochs.)
The two species have a combined Index due to the difficulty in identification unless a very close observation is possible. A surprising downturn in the Index for 1982 at Picket Wood compared with the results from the Bratton Castle site, where the value nearly trebled.

Meadow brown (*Maniola jurtina* L.)
A doubling of the Index Value from 1981 taking it to the highest ever recorded.

Ringlet (*Aphantopus hyperantus* L.)
This species has more than quadrupled its Index Value since 1978 with a steady increase throughout the period without the fallback in 1981 that most of the other Summer species suffered. Perhaps bearing out what some of the books tell us — that the species prefers wetter seasons!

Marbled white (*Melanargia galathea* L.)
The Index Value for this species which is much more associated with grassland and downland rather than woodland, follows very closely the pattern for the Meadow Brown.

White Admiral (*Limenitis camilla* L.)
A truly woodland species that is always a delight to see with its graceful flight and beautiful underwing pattern. Numbers were fairly low and steady until 1981 when an increase started and 1982 has seen a big increase again, possibly associated with the ride management.

Silver-washed fritillary (*Argynnis paphia* L.)
Another fine woodland species that has recovered well in 1982 after two poor years.

Dark Green fritillary (*Argynnis aglaia* L.)
None were seen in 1981 and only one specimen in 1982 although they had their best year yet at Bratton Castle, a habitat with which they are more closely associated.

White-letter hairstreak (*Strymonidia w-album* Knoch)
Only one specimen has been seen, on 28th July 1978 feeding on thistle near the entrance to the wood where a group of wych elm, the foodplant of the larva, once grew. Dutch elm disease appears to have had a serious effect on the populations of this insect.

Purple hairstreak (*Quercusia quercus* L.)
As already mentioned, this is a difficult species to monitor on the normal daytime transect due to its reluctance to descend from the tops of the oak trees. It appears to be much more active in the early evening sunshine (6.30 - 7.30) and the graph is for the Index Values for the evening transects.

Hedge brown (*Pyronia tithonus* L.)
This species and the Small Skipper are the two most abundant in the wood and up until 1982 accounted for nearly half the butterflies seen. In 1982, however, this proportion dropped to just over a quarter.

As with the Small Skipper, this species showed a downturn in 1982.

Double Brooded Species

Brown argus (*Aricia agestis* D. & S.)
This is not a woodland species, is easily overlooked or mistaken for a Common Blue and was not seen until 1980 in any numbers. Since then there has been a dramatic increase and it is now locally common in the wood.

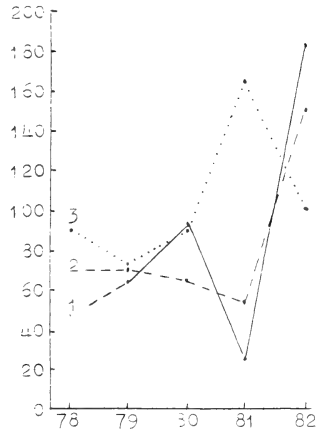
Small copper (*Lycaena phlaeus* L.)
A capricious jewel of a butterfly that has two Autumn flights in good years and can be seen on the wing as late as October. A large increase in numbers since recording began.

Common blue (*Polyommatus icarus* Rott)
A huge increase since 1978.

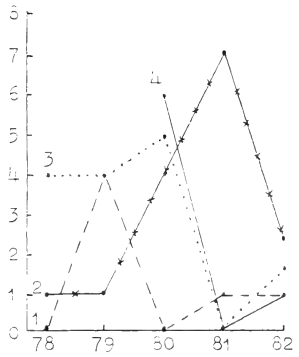
Wall (*Lasiommata megera* L.)
A scarce species in the wood although numbers were increasing until 1982 when there was a big drop in the Autumn flight.

Holly blue (*Celastrina argiolus* L.)
A species rarely seen but probably overlooked. It is known that its numbers do fluctuate widely.

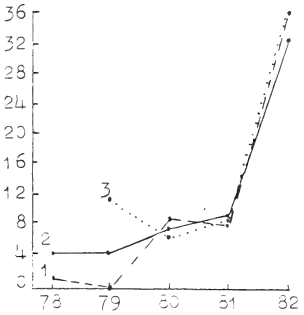
Graphs of Index of Abundance for the five years 1978 - 1982.



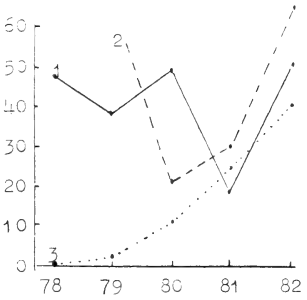
1. Small Tortoiseshell.
2. Peacock.
3. Speckled Wood.



1. Holly Blue.
2. Wall.
3. Green Hairstreak.
4. Dark Green Fritillary.



1. Comma.
2. White Admiral.
3. Brimstone.



1. Large Skipper.
2. Silver-washed Fritillary.
3. Brown Argus.

Speckled wood (*Pararge aegeria* L.)
A common species throughout the wood although somewhat local except in 1981 when it occurred in quite large numbers everywhere. There are three flights in the year but the Summer and Autumn overlap and are not easy to separate.

The 'Whites'

Large white (*Pieris brassicae* L.)
Not a common species in the wood and usually seen feeding from flowers on its way through the wood from one 'brassicae patch' to another. A big decline in 1980 and since then a steady increase in numbers.

Small & Green-veined white (*Pieris rapae* L. & *P. napi* L.)
The Index Values for these two species have been combined due to the difficulty in identification when on the wing at a slight distance, which occurs with about one third of the numbers seen. As for the Large White, a decline in 1980 but a big recovery in 1982 to give the highest value ever.

The Hibernators

These four species, the Peacock, Small Tortoiseshell, Brimstone and Comma are common and widespread throughout southern England, are highly mobile and are some of the first and last butterflies to be seen after and before hibernation. The abundance of the first two, especially in the Autumn, depends very much on the presence of nectar rich flowers (mainly thistles in Picket Wood) and this attraction brings them to our Buddleia, Sedum and Michaelmas daisy in the garden.

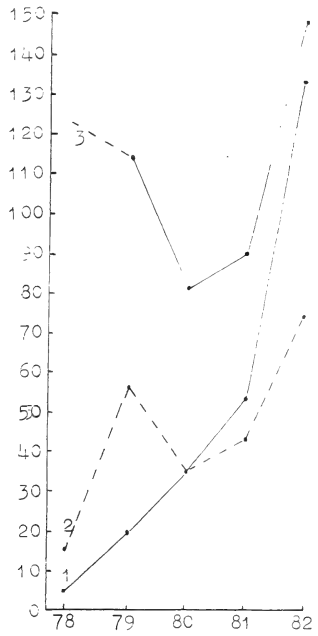
Small tortoiseshell (*Aglais urticae* L.)
A big decline in the Autumn flight in 1981 but an explosion in 1982 which I am sure did not need the monitoring scheme to show — they seemed to be everywhere!

Peacock (*Inachis io* L.)
Similarly a big increase in the 1982 Autumn flight after the downturn in 1981.

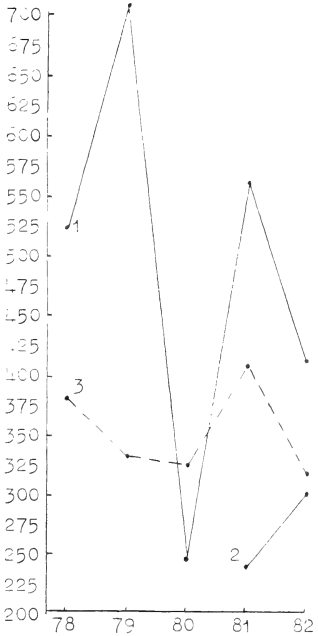
Comma (*Polygonia c-album* L.)
A species that appears early in the year after hibernation, as a second generation in July and again in the Autumn before hibernating for the Winter. Very scarce until 1980, a huge increase in 1982 in all three flights.

Brimstone (*Gonepteryx rhamni* L.)
Low Autumn counts until 1982 when the Autumn flight exceeded the Spring; once again 1982 showed a big increase in numbers.

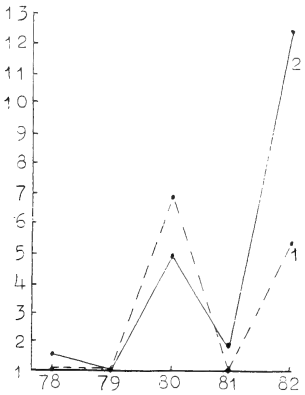
Graphs of Index of Abundance for the five years 1978 - 1982.



1. Common Blue.
2. Small Copper.
3. Small & Green-veined Whites.



1. Hedge Brown.
2. Purple Hairstreak.
3. Small & Essex Skippers.



1. Painted Lady.
2. Red Admiral.

The Immigrants

Red Admiral & Painted Lady (*Vanessa atalanta* L. & *V. cardui* L.)
These two butterflies which reach our shores nearly every year from North Africa and Europe, the Red Admiral and the Painted Lady, are more often seen as a second generation in the Autumn feeding in gardens, than when the first generation arrives in the early Summer.

The Red Admiral is the commoner of the two, although their Indices tend to follow the same pattern. In 1980 they were both common but 1982 has been the best year for them both so far. In some years none were seen in Picket Wood.

Conclusions

Picket Wood is probably typical of many old woodlands which have been cleared of the native deciduous trees and replanted with conifers over the last few decades.

I think the main reason Picket still supports a large variety of butterfly species is because of the way the belts of oak trees were retained and the way the rides have been kept fairly wide and open and regularly cleared to maintain access which has also allowed flowers to thrive. Most so-called woodland butterflies are associated with the rides and edges rather than the dense woodland and the way the oak belts have been left create a considerable length of edge type habitat within the actual wood as well as the variety of light, shade, warmth, shelter, open space and territory — the things butterflies seem so particular about. Also several species, although not needing the oak as a food source, use the trees to rest and roost in at night, notably the large Fritillaries, the White Admiral, the Speckled Wood and probably some others.

I suspect that the variety of species and numbers of each at the moment are at their highest levels and that as the closely planted conifers grow and prevent light from reaching the ground the various plants and grasses will disappear thus seriously depleting the larva food supply, especially the grass, violet and primrose feeders whose foodplants grow mainly between the young conifers.

When this situation occurs, the management of the rides where all of the sightings are made, will become very important. If these are wide and kept clear thus allowing flowers and grasses to thrive, then most of the butterflies should survive but probably in much lower numbers than at present, until such time as the wood is opened up again by the felling of areas of conifers allowing the butterflies to colonise the newly created areas. This is likely to happen because of the varying age of the conifers ranging from 1′ to 25′ in height.

The Monitoring Scheme was set up to monitor those long term changes in butterfly populations and by careful observations of species, their

location within a habitat and details of management changes, i.e. felling, clearing, ride maintenance, spraying, ditch clearance, etc. over a period of years, detailed management plants can be drawn up so as to prevent the extermination of local populations of these beautiful creatures that are being threatened more and more by urban and agricultural 'development'.

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Mike Fuller

THE 'BIRD DROPPING' WEEVIL — CRYPTORHYNCHUS LAPATHI L.

My two young boys refer to this beetle as the 'bird dropping' weevil, for when it is at rest on a branch or leaf, it is perfectly camouflaged as a dried black and white drop of bird dirt 7 - 8 mm long. My 9-year-old son Gideon first noticed the species under small poplar trees on the sand dunes at Candleston, near Porthcawl, Mid-Glamorgan on June 22nd 1982 (SS 872 767). We had not noticed them a fortnight prior to this, nor three weeks later, in spite of intensive searching.

This species is interesting for the spectacular damage it does to the young trees. Branches die and the bark splits open giving the appearance that the tree is ravaged by disease. Apparently, the adult beetles bore into the stems to lay their eggs and the larvae then live inside causing the damage. At first they live just beneath the bark surface, but later they tunnel into the centre and work along the branch. Adults also feed on bark and foliage. The life cycle is two years. The weevil is very damaging to *Salix coerulea* L. the Cricket-bat Willow, and may ruin it for commercial purposes.

At Candleston the trees are under stress through lack of water, and this may be a factor in causing branches to die. Also, the boring activities of the weevil may let other pathogens in, such as fungus.

The beetle may be caught be beating or searching the ground under the trees. Mating pairs can be spotted by carefully searching without actually touching the branches to disturb them.

We visited the site again in December to look for hibernating weevils in the dead twigs. However, we found only one dead specimen, but there

were plenty of tunnels in the dead branches where they and the larvae had been. In two thicker stems close to the ground we found larvae of the Goat Moth, *Cossus cossus*. This was also damaging the trees.

Cryptorhyncus lapathi is only locally distributed and several Coleopterists from the S.E. of England whom I spoke to at the AES exhibition, told me they had not found it there. However, careful searching on young Poplar or Willow may well reveal it in further habitats.

D. R. Copestake

THE FLEAS OF SAINT NENNAN

In Connaught there is a village well known for its church, which belongs to St. Nennan. Here in old days fleas were so abundant and were such a plague that most of the people left and the village became deserted until, by the prayers of St. Nennan, the fleas were all driven out into a nearby meadow.

Not a single flea thereafter could be found in the village, so filled was it with the cleansing spirit of holiness, on account of the virtues of the Saint. But the meadow has been so crowded ever since with the fleas that it cannot be entered by man or beast.

From a medieval manuscript.

SNIPPETS

The flea, that feeds on dust and blood, not long
Triumphs: he's snapped! Such is the end of wrong!
The spider builds in palaces: her own
Is web: in the midst whereof she's queen alone.
The silkworm's its own wonder, without loom
It does provide itself a silken room.

B. Holyday

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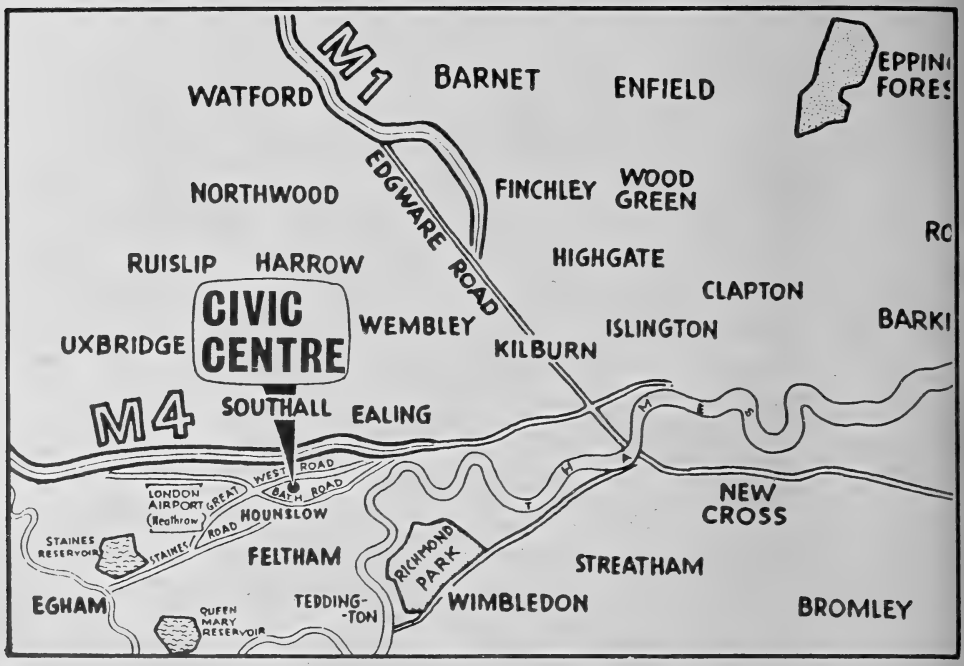
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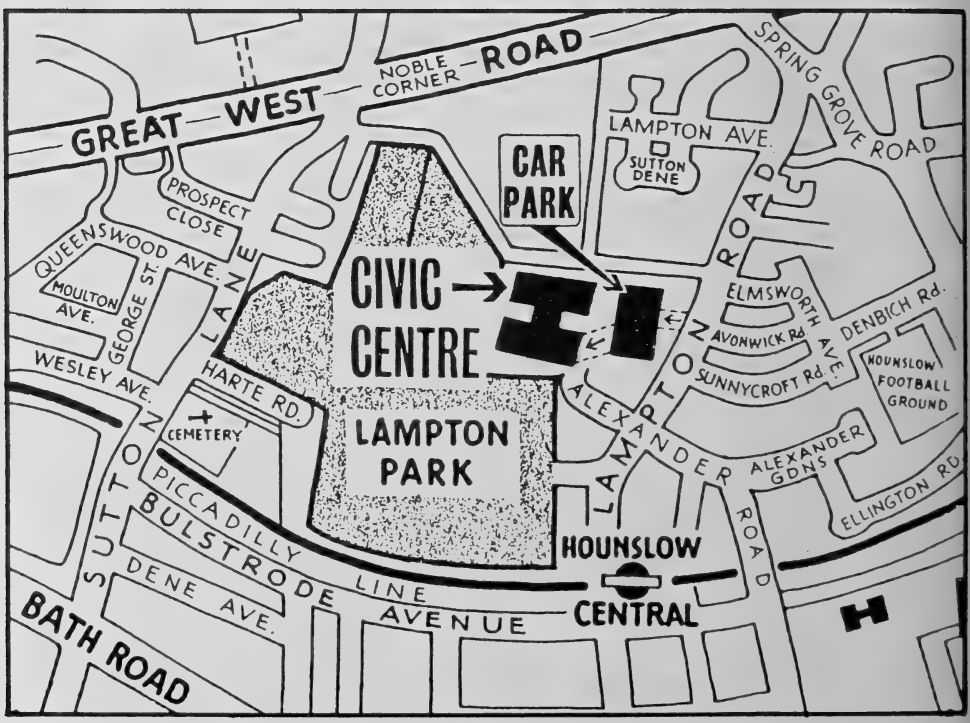
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VOLUME 42 NO. 341

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EDITOR:

BRIAN O. C. GARDINER, F.L.S., F.R.E.S.

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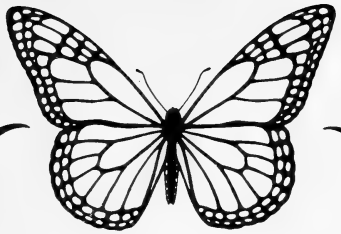

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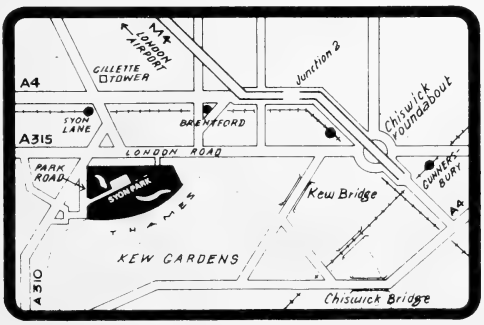

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AES BULLETIN

No. 341

EDITORIAL

As I see it, the recent Government decision to allow 'Development' — that is to say the erection of buildings on pockets of alleged sacrosanct green belt land — cannot be anything but detrimental to conservation interests. Many of these pockets allow breathing space for both recreation and for insect and other animal life on the edges of our larger towns. True that often such sites tend to be vandalised (i.e. dumping of rubbish) and often look untidy, but nevertheless, they form an important reservoir of natural history breeding sites. Already we have had a large number of open suburban sites destroyed by the continued infilling planning policy which has permitted the steady building over of the larger gardens that used to go with Victorian and even many pre-war houses. These, too, were an important reservoir of breeding sites for both birds, small mammals and insects as well as often containing ponds which served as habitats for frogs, dragonflies and similar aquatic life.

As these sites are built over, so will their present usage — whether it be recreational or rubbish dumping — be transferred outwards and so the Government can then claim that these sites, too, are an 'eyesore' rather than green fields and should therefore be developed. It is the thin end of the wedge. Just what is wrong with developing the thousands of acres of decaying inner city areas instead defeats us. If any of these green belt sites are known to be of special importance from a conservation viewpoint (they may perhaps be the only county habitat of some species or other, or even an SSI), then objections should be lodged as soon as planning application is applied for.

NOTES ON REARING THREE NYMPHALIDS

During the hot summer of 1975 I went on a collecting trip to a certain locality in Hertfordshire where there is an excellent breeding ground for many species of the Nymphalidae.

The area in question contains vast tracts of stinging nettle plants which border the edges of some agricultural land.

These clumps of nettles are protected from the prevailing westerly winds by screens of hedges and are also subjected to the sun's radiation for a large part of the day.

On the 12th July I spotted several colonies of Peacock butterfly (*Inachis io* L.) larvae in close proximity to each other. One colony of half grown larvae were taken home in a large pickle jar with a muslin cover on the top, which was secured with an elastic band.

While collecting, care was taken not to detach the larvae from the food plant or to handle them in any way, so I used a penknife to cut the nettle plants on which they clustered so that I could then drop the whole colony of larvae into the jar without undue disturbance.

Back at home, I had a large empty aquarium in which to rear my brood of larvae. Small jars with perforated lids were filled with water and used to stand the nettle plants in: these were placed in the aquarium together with the brood from the pickle jar. Using this method I knew I would not disturb the larvae when it became necessary to supply them with fresh nettle plants every few days.

For ventilation, I covered the aquarium top with a net curtain stretched between two separate rectangular wooden frames. Both frames were nailed together and the whole assembly rested on top of the aquarium so that it was escape proof. The aquarium was placed outside under the shelter of a lean-to glass house which was open at one end and had a semi-transparent plastic roof. This structure faced west. Direct sunlight was not allowed to hit the aquarium at any time since the high temperatures generated in a confined space would have been lethal. For this reason the aquarium was sheltered with newspaper on one side and over the top taking care not to obstruct ventilation. Temperatures inside the aquarium ranged from about 16°C at night to around 26°C in the afternoon. Larval growth was rapid and pupation took place on July 20, the larvae having gone through their last instar on the 15th. The bottom of the aquarium was left bare although before pupation I had placed large numbers of twigs in the aquarium, leaning against its sides at various angles. Most of the larvae crawled around the inside of the aquarium a day or two before pupation; some of them used the inside of the iron framework; others used the twigs, while only a few chose to pupate on the undersides of the nettle leaves.

Emergence took place from the first of August onwards and most of the butterflies hatching before sunrise. It was interesting to note that the eye-spot markings on the forewings of the butterflies could easily be seen through the pupal casing a few days before they emerged.

I released the butterflies in my garden and there were no aberrations noted. All pupae emerged, and only two crippled specimens occurred.

On August 10th 1982 I went on a similar collecting trip to the same area and I was lucky enough to find five large larvae of the Red admiral (*Vanessa atalanta* L.). These larvae have to be searched for diligently because they live in isolation unlike the former species. The one thing which gives away their presence is the fact that they like to make a tent of foliage by pulling together several adjacent nettle leaves so that they form quite a large enclosed canopy. These leafy canopies contain one larva each and can be spotted from a distance of many yards once you have become familiar with them. I took the larvae home and reared them in the same way as the Peacocks.

In the same week, I also found several larvae of the Comma butterfly (*Polygonia c-album* L.) although they were extremely hard to find since they also live in isolation and do not spin leaves together like the above species so there is nothing to give them away except for nibbled leaves and denuded shoots of nettles. What makes it more difficult is the fact that one has to crouch low on the ground and look upwards at the undersides of the nettle plants in order to spot them. Both the above larvae were reared successfully and the imagines hatched the same year, there being no failures except for the fact that I still have one *c-album* pupa on a twig standing in a jar in my bedroom!

There are no difficulties involved with the rearing of the three types of Nymphalid larvae mentioned above but I do advise anyone who wishes to rear them to make sure they get plenty of light otherwise they become lethargic. They need not be exposed to direct sunlight and reasonable ventilation should be given at all times.

Alan Winterflood (7739)

NOTES ON SATURNIIDAE — I
Three species of Citheronia

It is in the nature of things that, having finally seen off to press and had published, the third edition of *A Silkmoth Rearer's Handbook*, one's attention is at once drawn to some information that has been left out! Other people also realise that they now have some personal experience of species not detailed in the Handbook and wonder what they should do with it. The answer in their case is to write an article for the *Bulletin* and have it published. It is the intention of this series of notes, therefore, to put before the Entomological public, information on Saturnids which

will form in most respects a continuous supplement and updating of our recently published Handbook, and contributions from any source will be welcomed. We start off with notes on three species of *Citheronia*, the early stages of which have been beautifully described and figured by Manoel Martins Dias to whom I wish to express my thanks for sending me his publications describing them, and from which the following information on the early stages and foodplants is extracted.

The general remarks given for the genus *Citheronia* in the Handbook may be taken to apply to these species also.

Citheronia armata Rothschild.

A Brazilian and Paraguayan species, one of the smaller examples of the genus, 65 - 80 mm, the females as usual the larger. Colour cream and chocolate brown, but the veining chestnut-red. The forewing with about an equal mix of the two basic colours, a distinct cream teardrop-shaped spot at the base and the stigmatic spot in the form of four brown spots within a fairly clearly defined cream area. The colouring otherwise in the form of alternate longitudinal striae. Hindwing mainly cream but with a chestnut-red cellular spot and arrow-shaped brown streaks along the margin. The abdomen a chocolate brown, but intricately marked with cream ventrally, while the thorax has brown lines on a cream background running from the head dorso-laterally. Altogether a very attractive moth.

Ovum. This is large for the size of the moth, ellipsoid, 2.5 × 2.0 × 1.3 mm.

Larva. There are five instars and the larva is somewhat unusual in that the long frontal 'horns' are not present in the last two instars and the final instar does not change its colour prior to pupation. (It will, however, wander about looking for a suitable pupation site if facilities for underground pupators have not already been provided.)

The life cycle of this species appears to be fairly short, pupae having been obtained within a calendar month of the hatching of the ova, while adults emerged only four weeks after pupation. This of course when the larvae were reared naturally in Brazil.

Foodplant. *Anacardium occidentale.*

Citheronia hamifera Rothschild

Draudt considered this species as a form of *splendens* Druce, but it is designated specific status by Lemaire. The examples reared by Sr Dias were from the Mato Grosso region of Brazil. The moths are of course similar to *splendens* and indeed to *brisottii* Boisduval and it would seem that certain identification can perhaps only be made on genital characters, although extensive rearing may well disclose other specific features.

The egg is large, 3 × 2.5 × 1.4mm, coloured a light green. Hatch in about 14 days. The larvae, in the early instars, are barely distinguishable

from those of *brisottii*. There are five instars. In the final one about 110 mm long. The head a reddish chestnut. This colour and greyish being also the general body colour and the feet are also chestnut. The spiracles are ochre with a chestnut and black border. The prominent tubercles are light rose with black extremities. There is a more-or-less continuous broad wavy white lateral bond and each segment is sprinkled with darker dashes. As in the preceding species the larvae took about a month to feed up but the pupal period was rather larger at over six weeks.

Both the above species were reared (in Brazil) with the larval stage lasting throughout November.

Foodplant. *Terminalia catappa.*

Citheronia laocoon Cramer

This is another Brazilian species and Dias states that the moths are found chiefly from September to April. In his paper he also reviews the historical inexactitudes that have taken place as between this species and other similar members of the genus and gives a detailed comparison of the larva of this species with those others, particularly in the arrangement of the setae. The larva is on the whole typical of the genus and not very different from that of *brisottii*. The moth itself is of the usual yellow, reddish and ochre coloration (cf *brisottii*), and is perhaps best distinguished from the others by having a very broad unicolorous medial area on the wings while the basal and terminal areas are much more contrasting (being darker) than that of other species. The various stages are given by Dias as eight days for the ova, 36 days for the larval period and one to three months for the pupal.

Foodplants. *Ricinus communis* is much preferred. The larvae are, however, polyphagous having been recorded from a wide variety of plant families.

Brian O. C. Gardiner (225)

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A FURTHER LIST OF LEPIDOPTERA OF BARLASTON ROUGH CLOSE COMMON, STAFFORDSHIRE.

Since the first list published in this Bulletin (Vol. 40, No. 331, May 1981), quite a considerable number of species, all moths, have been added to the list. Methods of collecting were searching by daytime for moths at rest on trees and posts; sugaring at night; catching them on the wing. A homemade light trap was also set up in the area. This consisted of an old oil lamp and white sheets laid on the ground, also a sheet hanging down from a piece of cord from a tree. But this method proved to be not very profitable as not many species were recorded this way. The oil lamp did not seem powerful enough. Moths taken in the area were released after identification, in the area of their capture, the following day. Other specimens needing a second opinion, were put in the killing jar and sent away for identification, but these were in very small quantities. It will be evident that the list of lepidoptera in the area is incomplete as other species may be discovered, new species may spread from other areas, and visits from immigrants in future years to the area may be expected.

Tortricidae

Green oak tortrix (*Tortrix viridana* L.) quite common. Its food plant, oak, is quite common in the area. Caterpillars often met with, also the moth itself, one found in a spider's web 1981. Quite common 1981, not so common 1982. In 1976, the year of the drought, in Moddershall about a mile away, this species was abundant in a local wood.

Pyralidae

Nymphula nympheata L. one seen in July 1981. Disturbed in some bushes, near the pond on the banks. Further examples in 1982, quite common.

Ophiderinae

Herald moth (*Scoliopteryx libatrix* L.). Two found roosting in a bus shelter on Lightwood Road, in September 1981. Quite common in Staffordshire.

Ennominae

Brown silver-line (*Lithina chlorosata* Scop.) Scarce, only one moth, seen in 1981, its food plant, bracken, is plentiful in the area. It may prove more common in future than first thought.

Canary-Shouldered Thorn (*Ennomos alniaria* L.) a few in 1981-82.

Noctuinae

Double Dart (*Graphiphora augur* Fab.) Rare, only one seen in 1982.

Small square spot (*Diarsia rubi* View.) Fairly common, but in large numbers, 1981-1982, both broods quite common in Staffordshire.

Notodontidae
Coxcomb prominent (*Lophopteryx capucina* L.) Scarce, only two moths both in 1981, maybe more occur in the area.

Larentiinae
Foxglove pug (*Eupithecia pulchellata* Steph.) Rare, one moth in 1981. Foxglove, its foodplant is not very common, at Rough Close only a few clumps here and there, but about a mile away it is quite common.

Tawny-speckled pug (*Eupithecia icterata* De Villers) Not very common, a few seen in 1982, mostly seen at rest during the day, on posts and trees.

Common carpet (*Epirrhoë alternata* Mull.) Fairly common, 1981-1982.

Northern spinach (*Lygris populata* L.) Fairly common, a few seen 1981-1982, most disturbed when walking through bushes during the day.

July highflyer (*Hydriomena furcata* Thunb.) Fairly common, seen in 1981, but not in large numbers.

November moth (*Oporinia dilutata* Schiff.) Scarce, only two moths, both in the Autumn of 1981.

Winter moth (*Operophtera brumata* L.) Not very common, only a few seen in 1981. All these were on the outskirts of the common, near the gardens of some of the houses, where there are plenty of trees.

Amphipyrinae
The Mouse (*Amphipyra tragopoginis* Clerck) Fairly common, seen in 1981-1982.

Small angle shades (*Euplexia lucipara* L.) Scarce, only two moths, one in 1981 and one in 1982.

Angle shades (*Phlogophora meticulosa* L.) Common, seen in Summer and early Autumn 1981, also Summer 1982. None seen in Winter, but may well occur in the area during Winter months.

Dun-bar (*Cosmia trapezina* L.) Scarce, one moth 1981. Also one caterpillar of this notorious cannibal, on oak near the pond, also in 1981.

Dark arches (*Apamea monoglypha* Hufn.) Fairly common, 1981-1982, one melanic variety, 1981.

Clouded-bordered brindle (*Apamea crenata* Hufn.) Fairly common, seen in 1981.

Common rustic (*Apamea secalis* L.) Scarce, one moth 1981, but maybe more occur in the area, which have been overlooked.

Mottled rustic (*Caradrina morpheus* Hufn.) One 1981.

Plusiinae

Beautiful golden Y (*Plusia pulchrina* Hubn.) Fairly common, moths seen in 1981.

Plain Golden Y (*Plusia iota* L.) Scarce, only one moth seen, end of June 1982.

Hadeninae

Pale-shouldered brocade (*Hadena thalassina* Schiff.) Rare, only one seen in 1981.

Bright-line brown-eye (*Diataraxia oleracea* L.) Common, seen in 1981-1982.

Antler moth (*Cerapteryx graminis* L.) Not very common, a few seen in 1981.

Smoky wainscot (*Leucania impura* Hubn.) Not very common, a few seen in 1981, one in 1982.

Common wainscot (*Leucania pallens* L.) Common, seen in 1981-1982, mostly seen near the pond area, on the long grass, quite often disturbed.

The Dot (*Melanchra persicariae* L.) one larvae 1982, scarce.

Hypeninae

The Snout (*Hypena proboscidalis* L.) Common, seen in 1981-82. Nettle, its food-plant, is quite common in the area.

Westermanniinae

Green silver-lines (*Bena fagana* Fab.) Scarce, one moth 1981, found dead on the roadside near the pond — it was in quite good condition.

Oenochrominae

March moth (*Alsophila aescularia* Schiff.) Scarce, a few in 1981, one in 1982 at rest on tree trunk, near the pond.

Geometrinae

Grass emerald (*Pseudoterpna pruinata ssp tripunctaria* Walker) Scarce, one moth taken in July 1982. This was sent to Mr Bernard Skinner for identification because it was worn and devoid of markings. Mr Skinner said he was only 90% certain it was the Grass emerald. It is stated by Warren to be local and uncommon on heaths in Staffordshire.

Zygaenidae

Narrow-bordered five-spot burnet (*Zygaena lonicerae* ssp *transferens* Verity) Very common in 1981-1982, large numbers seen near the pond, also cocoons attached to stems of grass nearby. This species may have been mistaken for the Five-spot burnet, (*Z. trifolii* Esp.) in the first list, so this species now requires confirmation.

Hepialidae
Gold Swift (*Hepialus hecta,* L.) A few seen in 1981, at dusk flying on the outskirts of the Common. Quite common. Map-winged swift (*Hepialus fusconebulosa* de Geer) Often seen at dusk darting about. Its food-plant, bracken, is quite common in the area, quite a common moth in 1982.

Acknowledgments
I would like to thank Mr B. F. Skinner for the identification of some species which I sent to him. Also Mr R. G. Warren, author of Atlas of the Lepidoptera of Staffordshire, and a late thank you to Mrs V. Riley, B.A., for her help with information on the area in the first list printed in 1981. Also a big thank you to Mr G. Halfpenny, Keeper of Natural History at the City Museum and Art Gallery, Broad Street, Hanley, Stoke-on-Trent, for letting me see the Lepidoptera collections in the museum, which were of great help to me in identification of species. I would also like to congratulate the Museum on winning the Museum of the Year Award 1982.

Jan Koryszko (6089)

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CRYONECROTICS AND WASPS

I read with interest the articles by Mr Beswick and Mr Patel on the use of the deep freeze.

I believe that cryonecrotics (killing insects by reducing temperature) is not a technique of any use to the entomologist, or even to the lepidopterist. Many insects are surprisingly good at surviving temperatures below freezing point for a considerable period and yet I have had others that succumb surprisingly easily.

In order to photograph various small insects (a far better option than killing, wherever possible) I put them in the fridge for a while to slow them down. A small Carabid (Ground beetle) is sufficiently slow after only 15 minutes in the main part of the fridge whereas a large *Carabus* may need an hour. Occasionally though a beetle has died in these short periods, having not even been in the freezer.

A beekeeper in Sale (John Charlton) performs the service of removing wasps' nests that are in inconvenient places. In July 1982, having

identified an undamaged occupied nest for him as belonging to *Dolichovespula norwegica* (the Northern tree wasp), he was kind enough to deliver to me the still occupied and poison-filled nest of *Dolichovespula sylvatica* (the Tree wasp) for me to have a closer look. The nest was impregnated with sulphur dioxide and there was no sign of life. As I was just about to leave for a week's holiday, I put the nest (which was in a plastic bag) into my fridge. Ten days later, I removed the nest and was surprised to find buzzing noises. I sprayed the nest comprehensively with an insect-killing spray, allowed some time in the warmth of the wasps' bodies to absorb the poisons and then placed the bag in the deep freeze for two hours. Later, I opened the bag and found that the grubs were still squirming and that the wasps were gradually reviving as they warmed up.

With forceps and an Ethyl ethanoate killing bottle, I finished them off one by one and took all the photographs I wanted to. I kept pupae for a while but all were dead.

The divergence in reactions to cold is so great that I cannot regard freezing as an appropriate method of killing — the problem of finding out whether an insect is dead when it may only be moribund could cause an awkward reawakening on the setting board. The use of the usual ethanoate (used to be called acetate) killing agents or Hydrogen cyanide is surely the best method.

The deep freeze is an ideal way of preserving specimens until such time as they are to be dealt with. It prevents decay and will not (permanently) stiffen the body.

I was once advised to place stiff corpses in spirit vinegar to remove stiffness and have found this effective with some long-dead beetles that I have been sent. Any fairly dilute solution of ethanoic (acetic) acid should do.

Martin J. Wallace Smith (5794)

A FURTHER USE OF THE DEEPFREEZE

The recent correspondence on the role of the deep-freeze in entomology prompts me to add the following.

A problem I encountered several years ago was how to display soft bodied insect specimens aesthetically. Fluid preservation based on alcohol or formaldehyde solutions are common scientifically but for the amateur they are understandably less appealing than dried specimens in cabinets.

The ideal would be freeze-drying. The resultant specimens would retain their natural colour and dimensions and to an extent be less brittle

than their air dried contemporaries. However, involving expensive high-vacuum and low temperature apparatus one sadly has to dismiss this method.

The alternative is freeze substitution, a technique used to prepare material for microscopy. Though the literature again suggests elaborate equipment and tiny quantities of tissue, I have empirically arrived at a solution easily carried out at home. The specimens I used were wasp (*Vespa* sp.) larvae of different ages and maggots (*Calliphora* spp.). These were placed directly into a jar containing absolute alcohol that had already been chilled in the deep-freeze. The water in the tissues will quickly freeze and then the slow process whereby this ice is dissolved by the alcohol begins. As the water is in the solid phase the distortion that can occur when soft specimens are placed in undiluted alcohol is prevented. After about four months the specimens were removed and the alcohol allowed to evaporate at room temperature. The resultant specimens were just as pale as in life, and apart from their paper-like weight, seemed identical to the original.

The volume of alcohol used was 200 ml for 20 specimens. Unfortunately, I have not had the time to determine the optimal quantity of alcohol per specimen or the minimum period of time to complete the freeze-substitution. In my case I was fortunate, being able to show a complete developmental series for two holometabolous species in a single display box.

A note of caution — ensure you use a lid with a good seal as alcohol vapour could accumulate in chest freezers to explosive levels.

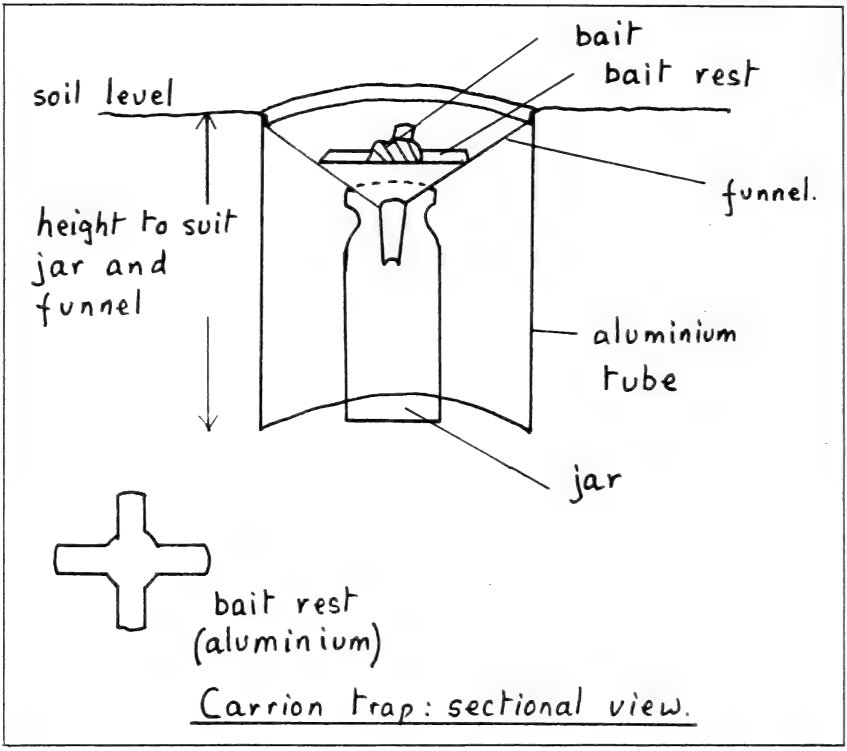
My conclusion is that freeze substitution is a promising technique especially for small, delicate specimens. However, I do not think it would be a suitable alternative to the old method of 'blowing' for the large lepidopterous larvae.

A. J. MacLellan (5258)

CARRION BEETLES

In the Spring of 1982 Stephen and I decided to do a study of local carrion beetles. We live in a mountainous part of S. Wales where in certain places there are always dead sheep around; it was our guess that these sites abounded in carrion beetles. In particular there is a small, steep sided valley known as Fforch's Nest, about 1½ miles from our house, which is littered with sheep bones. It is accessible along narrow sheep tracks and by negotiating large boulders along a dry river bed.

On our first trip in April we examined twelve dead sheep in about half a mile of valley and saw three more on the hillside. They were in various



Carrion trap: sectional view.

stages of decay. The smell from some of them was awful, and we tried to keep to the windward side of them whilst examining them. Our method was first to have a good look around the carcase, and then to turn it over with the aid of trowels. We were delighted to find a good number of beetles, and sometimes we were so excited over a new find that for a moment the smell of the sheep vanished! We discovered various Histeridae, *Creophilus maxilosus*, Silphidae, Dor beetles, and a *Necrodes littoralis*.

On our second trip a week later, we took rubber gloves and an old carving knife to cut apart a sheep in which we had found *Necrodes*. Also we carried a white sheet on which to shake dried carcasses. We were pleased to find a large male *Necrodes* and several small beetles in the dried carcasses including *Omosita depressa*.

We had to confess to each other that the smell of this job was getting really a bit too much, and so we decided to set carrion traps. The trap described in the Coleopterist's Handbook seemed to have certain drawbacks and so we designed our own improved model. It consists of a sheet of aluminium riveted into a tube with a six or nine inch plastic

funnel fitting tightly into one end. The funnel had the narrower part of the tube cut off to allow large beetles to pass through, and inside the funnel rested an aluminium cross piece on which to rest the bait. A glass coffee jar completed the equipment.

To set the trap a hole was dug to accommodate the aluminium tube. Earth was carefully packed around the outside and made level with the top. The jar was placed inside with about 1″ of 2% formalin solution in the bottom; the funnel was placed on top, then the bait inserted. As there were plenty of large stones around, one was placed over the top, supported by small flat stones 1″ thick in order to keep off rain and help to prevent animals from removing the bait.

We experimented with bits of raw meat and fish heads. Both were successful, perhaps the fish heads more so. We also placed a simpler sort of trap which consisted of three jam jars placed in the ground in a triangle 2″ apart. The bait was placed in the centre. This was quite successful, but not as convenient as the other trap. The beauty of the other trap is that the funnel and bait can be removed to give access to the jar without disturbing the soil each time. Also small beetles do not fly out readily.

By using four traps, set along the valley, we were able to catch more species of carrion beetles. These were *Necrophorus humator, N. vespilloides*, various Histeridae, *Saprinus rugifrons*, and various ground beetles including a garden tiger. The bait can smell terrible after a few days, but it is far less objectionable and more convenient than searching the carcasses of dead sheep. It is also a far more successful method of catching the beetles. (Except *N. littoralis* which was never caught in a trap.)

After setting traps for three weeks in this area we decided to try different habitats. On our last trip we found a dead dog, under which were dozens of *Necrodes*. One new habitat was the coastal sand dunes near Porthcawl; here we found several new Histeridae; the click beetle *Brachylacon murinus*; *Onthophagus ovatus*; *N. investigator*; besides other beetles we had already obtained.

The next habitat we chose was an old oak wood four miles from our house, but after laying traps for one week, we caught only one *N. investigator*. We decided to try another wood a few miles further on, known as Hensol Forest, where we had seen *Oeceoptoma thoracica*. As the ground here was so intertwined with roots, we used only jam jar traps, as it was impossible to dig deeper for the aluminium cylinder. After leaving the traps for ten days we discovered several fine specimens of *O. thoracica*, lots of *N. investigator* and *vespilloides*, and *Ontholestes tessalatus*. This beetle is covered with lovely golden pubescense and is perfectly camouflaged against the woodland floor of leaves and pine

needles. They are very fast moving and jerky, much more so than *C. maxillosus* which has grey hairs.

We visited our local Fforch's Nest, the 'valley of dry bones' again in July, whilst looking for other types of beetles, and casually turned over a dried sheep carcass. There was a roundish beetle so covered with muck that it looked just like a pellet of sheep dung. I thought it was a large pill beetle, but on cleaning it up we found it was the rare *Trox sabulosus*, not recorded before in the County records (1933). Hoping to find more of these, we set a trap in the vicinity consisting of a bundle of old bones wrapped in wire netting over four jam jars, but we were unsuccessful. We were sorry that we had not searched the sheep carcasses throughout the Summer. However, in this trap we caught a different sexton beetle, *N. vespillo*.

This part of South Wales is certainly good for carrion beetles, there cannot be many areas in Britain where one can find 15 dead sheep in half a mile of walking! May I add that this is a rather inaccessible area, and that the local Council and farmers are very good at removing carcasses from around the streets (where sheep still wander), and where they might present a health hazard. We would be glad to hear from members who have collected carrion beetles in other parts of the country and possibly exchange specimens.

David and Stephen Copestake (7344J)

NOTES ON COLLECTING FLEAS

A Siphonapterist needs to be a mammalogist, an ornithologist and an ecologist if he is to maximise his collecting opportunities. He will continually be frustrated by the lost chances he hears of in connection with the work done on the hosts of fleas, whether it be on mammals or on birds; he must live in hope that he will be able to persuade his colleagues to collect whenever possible and he must be prepared to accept with gratitude any quantity of material no matter how small. The notes given below are the results of working as an individual for some years with a minimum of equipment: the procedures suggested can be considerably modified in the light of circumstances and the availability of facilities and finance.

Fleas may be obtained either from the bodies of their hosts or from the nest material, the latter normally produces the larger quantities of specimens.

Birds Nests

Nest collection provides the largest number of species and of specimens but it is not always possible to be absolutely certain of the host. The nest

material should be stored in a very tightly sealed tin or stout polythene bags. Each nest must be stored separately and it is advisable to put polythene bags inside extra bags to reduce the risks attendant upon punctures. At convenience the material can be subjected to either extraction procedures involving the use of Tullgren or Berlese funnels or searched manually which takes many hours but, in my opinion, gives far better results. The apparatus needed is: large steep-sided bowl; specimen tubes containined 70% alcohol (never formalin); dissecting needle; large sheet of white paper; large tin. The collector should wear a white shirt and work with sleeves rolled up. A small amount of material is placed in the bowl which should stand in the centre of the white paper and any adult fleas seen picked up on the end of the alcohol moistened needle and transferred to the tube. In the nest material there may be cocoons which can be opened at the truncated end and, usually, the adult flea will emerge with a rush only to be collected. When it seems that the nest sample contains no more adults it can be put, as debris, into the tin and any overlooked specimens will thus be prevented from escaping; if the material contains larvae they can be bred out. Any flea which jumps free onto the table will be seen on the white paper, bare arms or white shirt and caught straight away. This method of collecting will produce hundreds of specimens as against the tens or scores of the funnel methods, and will thus provide more accurate statistics concerning species/population studies and more certainly shows up any species which may be present in very small numbers. It is the easiest way of collecting bird fleas.

Mammals

Body collection is the easiest way of collecting most mammal fleas and almost the only way of collecting bat fleas. Human fleas are generally collected from bodies! The bodies may be obtained by trapping or shooting; alive or dead according to species and facilities. Bats should be hand-gathered or net-trapped. The method of flea collecting varies according to host size:—

(i) Large bodies should be visually examined first of all and specimens tubed. Then they can be hung over a wide pan of water containing a little detergent. As the fleas drop into the water they sink, to be collected later.

(ii) Medium bodies, such as squirrels, rats and hedgehogs, should be put into a polythene bag with a little anaesthetic. After a few minutes they can be searched over white paper and all the ecto-parasites, including ticks, mites, beetles, lice, etc., collected. If the host is to be kept alive the anaesthetic should be ether and a glass container used for the body. Searching should be done immediately the animal becomes unconscious.

(iii) Small bodies, such as mice, voles and shrews, are most easily obtained by trapping. If live-trapped, and live-release is an objective, very slight anaesthesia should be obtained with ether or the animal can be held by the scruff of its neck over white cloth or lint and the collector blows through its fur. The fleas will, generally, hop off and get entangled in the cloth fibres. However, live-traps are bulky and expensive and most mice, voles and shrews are so common that losses resulting from the use of nipper traps, which are small, light and cheap, make negligible effects on the populations (this may not be a valid comment for very small islands or small, specialised and restricted habitats and populations). Here I propose to describe my own method which needs a minimum of equipment and cost and is, therefore, attractive to anyone without the resources of grants and laboratories behind him:

The equipment, apart from the traps, is: a largish tin, anaesthetic, supply of old envelopes, collecting tubes with 70% alcohol. The traps, which should be set very fine, should be visited at least twice a day, early and late. When I find a trap containing a body I place on the ground close to it an open old envelope. Then I very gently lift the trap and body and slide both into the envelope. Then the body is released and the trap set aside. The envelope is rolled round the body and put into the tin with some anaesthetic, lid replaced, trap rebaited and reset and tour of the trap line continued. By the time I reach home all ectoparasites are dead. The bodies and envelopes are examined one by one and all parasites collected. Often fleas will have crawled into seams or folds in the envelope which is torn apart in the search for these wanderers. Some collectors use cloth bags, but, because of re-use, these introduce a considerable risk of a parasite being overlooked in a seam and shaking loose with a different host species later on, thus resulting in inaccurate host/parasite records to say the least; the envelope methods eliminates this potential error.

(iv) Bat Fleas are usually collected from live hosts as bat populations are rarely very large and cannot stand depletion. The apparatus is a jam jar, blotting paper and ether. The bat is put into the jam jar, then a small piece of blotting paper with three drops of ether (never chloroform) and the jar closed with a hand. Immediately the bat becomes unconscious it is tipped out and searched, usually it recovers within a few minutes. Often bat fleas can be reared from gatherings of droppings found below the roosts.

(v) Living birds should be examined with the use of the Williamson apparatus (Williamson, 1954), which is expensive and in part, fragile. A rough version can be made from a jam jar and a piece of oil cloth. Some anaesthetic is put in the jar, the bird's head through

a small hole in the oil cloth and the body of the bird then lowered into the jar. The oil cloth closes the top of the jar and keeps fumes away from the bird's head. As the bird flutters, the parasites amongst its feathers are anaesthestised, fall off and can be collected later. It is essential that the jar is cleaned with great care between each bird to prevent parasites from one bird being collected with those off a subsequent examinee.

Labelling

It is desirable that each collection, i.e. from individual nests or bodies, be tubed separately and it is *essential* that each tube be labelled adequately. The data should include: host species, whether body or nest, locality, county, country if appropriate, grid reference if possible, date and collector's name, written in pencil or Indian ink on a slip of paper placed inside the tube. If collecting is done in mountainous districts the altitude of the actual collecting site (if not camp) should be quoted.

Sending by Post

From time to time as swaps, presents, or identity confirmation, material needs to be posted. Tubes must always be adequately packed to withstand the ravages of the G.P.O. Nests must be packed in fleaproof containers — it is not reasonable to expect postmen to handle packages oozing with fleas.

A space and weight saving substitute for a tube is a piece of tissue paper moistened with alcohol, the fleas are put onto the paper which is folded over them. Then the whole is sandwiched in aluminium foil, the edges are folded over two or three times and pressed down very hard. This makes a reasonably liquid proof seal and the package can be posted even by airmail without excessive cost.

Insofar as the mapping of the distribution of fleas in Great Britain is concerned the best map only has 16% of the ten kilometre squares marked in. This, perhaps, gives a measure of the great need for specimens from everywhere.

R. S. George

REFERENCE

WILLIAMSON, K. (1954) The Fair Isle apparatus for collecting bird ectoparasites. *British Birds*, 47: 234-235.

(Leaflet No. 29 on collecting fleas, also by Dr George, is available price 55p from our Publications agent — Editor.)

THE FIFTH MIDLANDS ENTOMOLOGICAL FAIR AND EXHIBITION

With uncanny precision, a lively Atlantic depression swept in a dawn deluge just in time for the journey. Nor did the dismal rains abate before midday. Even so, this latest Leicester Fair beat the attendance record yet again. A hardy breed, we butterfly enthusiasts!

But then, is it not true that an extra spice of excitement may be derived from winning the best exotic specimens by braving the worst British weather? One now also feels that we already have a stimulating tradition of Leicester heralding Spring, except that, as I write, (in late May), it feels as though we're still waiting for it.

Although so cold and bleak outside, the atmosphere in the Grand Hotel's gracious main hall soon hit the eighties, as eager bodies crammed ever tighter in a seething mass. After our spacious comfort within the same hall last year, this sardine syndrome came as a disappointing surprise, but it was due to our having only about two-thirds of the original display area, because there had been complaints of inadequate lighting in the other section. I personally preferred last year's soft light to this year's hard crush.

Anyway, for next year, we are assured that all will be different! The Sixth Midlands Entomological Fair and Exhibition is to take place on Sunday, April 8th, 1984 at Leicester's Granby Halls Sports Centre. In a brightly lit exhibition area described as the size of a football pitch, all we athletic visitors, traders, and exhibitors will be encouraged to spread our wings as never before, so it should really be a marathon event. As always, the organisers — one might now call them the promoters? — will be pleased to post full details to everyone interested who supplies a s.a.e.

More and more people are now asking whether additional functions of this kind might be held each year, particularly in different parts of the U.K.? It is already common practice to do so in some Continental countries, and, since we have never seen a Leicester or an AES Exhibition under-supported, there seems every reason to anticipate success in this country, too, provided that the organisation and advertising were equally efficient. As a matter of good taste, too, I feel it is important never to forget the sensitive balance between butterfly commercialism and butterfly conservation, so that, whatever may be one's mode of activity, we should collectively be seen celebrating our insect fauna, not abusing it.

Anyway, I'm sure that Leicester will continue to be an eagerly-awaited annual pilgrimage for many of us, as it is for me, and who knows which new cities may, in future, follow its shining example?

Brian Wurzell (3718)

'LOOK OUT! HERE COMES A COPPER!'

For some years now John Berry, a fellow of the international 'Fingerprint Society' also the Editor of the Society's journal 'Fingerprint World', has probed the mysteries of fingerprints. One of his lasting interests has been to collect examples of ridge details in nature.

To give members an idea of what we are looking at I shall explain. As most people are no doubt aware, on the face of our hands and the base of our feet, are skin ridge patterns. In particular it is common knowledge that there are fingerprint patterns on the skin of the last joint of each of our digits.

However, these patterns are not the unique identifying criteria which Fingerprint Experts, the world over, use. The actual patterns (used, nevertheless, for filing purposes) are comprised of papillary ridges and these are shown in Figure I.

These ridges stop; start; divide into two, or two converge into one, etc. It is the relationship of such characteristics which gives each fingerprint its individual identity and Figure 2 shows such a one.

Now you may ask, 'What has this to do with Entomology?' Well, following John Berry's study of Ridge Detail in Nature (Berry 1983) some five months ago I came upon a Peacock butterfly trapped in my garden shed. Before releasing it, as is my usual practice, I had a good close look, marvelling at the design, colours and general beauty of the creature. My eyes were immediately drawn to the upper side of its forewings.

At the leading edges were bars which displayed marks remarkably like ridge characteristics. Excitedly, I checked the modest Oxford Book of Insects I kept in my library and found an illustration of *Inachis io* which, to my delight, also manifested this intriguing pattern of marks. I then made a decision and, with regret, dispatched the unfortunate creature, the object of my curiosity.

As can be seen from Figures 3 and 4 the bars have short 'ridges' which divide into two shorter independent ridges and spurs. Now, obviously, on each wing (or even totalling both wings) the number of ridge characteristics by no means equals the number that can appear on the upper flange of a single digit.

The discovery in itself is startling; however, in view of the fact that the marks exist a number of questions arise:

1) Which other species in the same and other families display this particular form of detail?
2) Does the disposition and type of characteristics alter from family to family and from species to species, or even on a regional basis?

Fig. 1 Examples of Ridge Characteristics

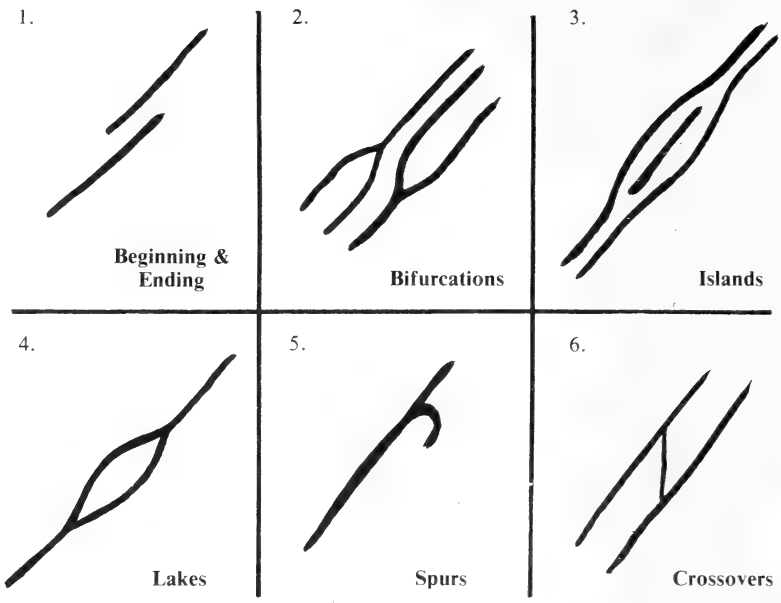
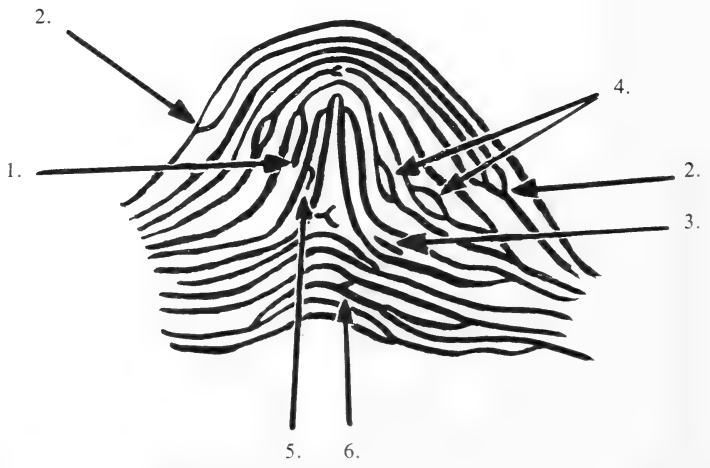


Fig. 2 Ridge Detail Relationship



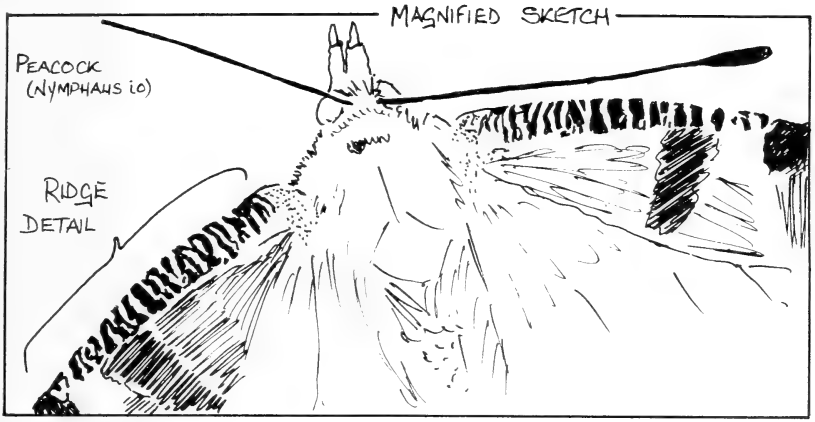


Figure 3. Diagram of costal area of Peacock butterfly, showing pattern style.

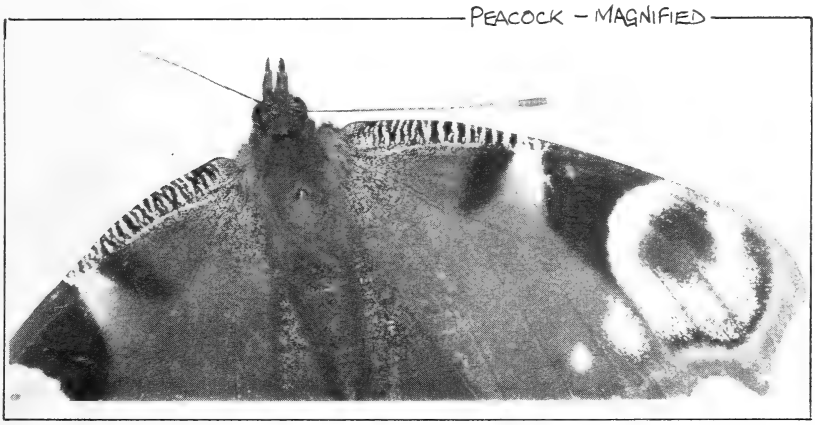


Figure 4. Photograph of same butterfly, clearly showing the patterned bar markings.

Fig. 3 is a drawing indicating the area and pattern style while Fig. 4 is a photograph of the same butterfly.

3) Does the disposition and types of characteristic alter from individual to individual within a species?

4) How long have these marks been associated with these particular butterflies?

At the moment I can answer only one of the questions because of the limited nature of my observations. Question 1) — from my basic enquiries I have tabulated this list of butterflies displaying, to a greater or lesser degree, ridge characteristics;

VANESSIDS (Nymphalidae)

a) *Vanessa atalanta* L. — (Red Admiral)
leading edge of underside of forewing.

b) *Cynthia cardui* L. — (Painted Lady)
leading edge of underside of forewing.

c) *Aglais urticae* L. — (Small Tortoiseshell)
leading edge of topside of forewing.

d) *Nymphalis polychloros* L. — (Large Tortoiseshell)
leading edge of topside of forewing.

e) *Inachis io* L. — (Peacock)
leading edge of topside forewing (pronounced)
leading edge under forewing (subdued).

f) *Polygonia c-album* L. — (Comma)
suspected; not viewed.

g) *Nymphalis antiopa* L. — (Camberwell Beauty or Mourning Cloak)
leading edge top forewing.
BROWNS — (Satyridae)

h) *Hipparchia semele* L. — (Grayling)
leading edge — top and under forewing (subdued)

Questions 2) and 3) — These, at the present time, I cannot answer, obviously, until more specimens come to hand for scrutiny.

Question 4) — This I can only answer by gaining access to collections with well documented collecting dates and by then photographing the specimens.

Then i) checking for introduction of the marks
and ii) seeing in the existing marks any noticeable changes (if any) of characteristics over time with relation to family and genus.

Question 3) can possibly be answered by pursuit of current observations and tabulation of facts gleaned from checking over established collections.

One of the reasons I have submitted this article to the Bulletin is a need for expert advice within a field of study, of which I have very little knowledge. The second reason is a request from the membership for assistance. Assistance in specific and regional observations of these butterflies.

At the moment my studies are in a very preliminary stage until more is known and that it can be seen that some definite line of forward study is indicated.

R. D. Ball

REFERENCE

BERRY, John (1983). *Ridge Detail in Nature.* The Fingerprint Society.

BOOK REVIEWS

Papillons d'Europe, Le Multiguide nature des, by Ivo Novak, F. Severa & G. C. Luquet. Published by Bordas of Paris 1983. 352pp. 128 coloured plates. Price not stated.

A gift from a French correspondent, this pocket guide to the Lepidoptera of Europe makes a welcome addition to the growing library of guides to the order. The work was originally published in 1980 in Prague and has been translated for this French edition by M. Luquet. It deals with the whole order from the butterflies to the Micropterygides but obviously on a very selective basis, figuring and describing briefly those species most likely to be observed by the general naturalist. The first seventy pages are text dealing with the classification and biology of Lepidoptera, sexual and seasonal dimorphism, variation and distribution. Collecting, breeding, curating and other practical matters are well explained and there is a fourteen page key for ascertaining the family to which a specimen belongs. The line drawings in this first part are excellent. The best part of the book follows — the colour plates. These are as good as any that appear in Higgins & Riley's guide to the Butterflies of Europe and many plates include pictures of larvae. The majority are full size but the smaller moths are enlarged with the dimensions of the wingspan given in the facing text. The text includes the French common name of the species, habitat, months of flight, the foodplant of the larva and stage of hibernation. I expect that many of the 'common names' are made up by the author as the French are no more likely to differentiate between one tortricid and another than are their British counterparts. A book to recommend to those who can read French and are thinking of an entomological trip to La Belle France. The pictures alone make it worth adding to your library.

PWC

The IUCN Invertebrate Red Data Book by S. M. Wells, R. M. Pyle, and N. M. Collins. pp L + 632, illustrated. Large 8vo. IUCN, Gland, Switzerland 1983. Price £15.00

We welcome the publication of this long awaited book which puts into perspective the status of species in danger of extinction and the compilers are to be congratulated on a very fine effort.

As the title implies this book deals with all invertebrates not just insects which, in spite of their far greater number, occupy but a third of the pages. A certain amount of space is also taken up discussing 'threatened communities' rather than individual species or in some cases groups of species. There are fifty pages of introductory and explanatory matter, most of these being taken up by a complete Taxonomic list of all the threatened invertebrates (including English vernacular names where appropriate) followed by the species listed under Country of occurrence, and we are pleased to note here that 'Eastern Bloc' Countries are included.

The main text takes us through the phyla species by species, or in some cases, groups of similar species and finally areas of habitat that are threatened by various pressures. The text is well and clearly laid out and although this is a 'camera-ready' production the copy has been produced on a sophisticated word processor using a variable spaced daisy wheel output. Apart therefore from the lack of the conventional *italic* lettering, an actual underline being used instead, the printing is up to the standard of conventional typesetting and for the size of the work, is offered at a very reasonable price indeed. Throughout the text, too, are a number of very delightful illustrations by the artist Sarah Anne Hughes. By chance or otherwise most of these — and certainly some of the best — occur in the Insect section.

The text is laid out with a large and clear heading, well spaced out. We are given the English vernacular name, the scientific name, the phylum, class, order and family and, on the top right-hand of the paper, its status. Of this there are several categories, *viz* extinct, endangered, vulnerable, rare, indeterminate, out of danger, insufficiently known, commercially threatened.

Following this title are a number of headed paragraphs which vary in length from a single word to a couple of pages. These paragraphs are titled, and their contents contain, as follows:—

Summary: Usually brief and succinct.

Description: Also brief as it is not intended as an identification key but often a reference to where such details can be found is given.

Distribution: Past, present and probable are given.

Population: Often unknown, but where recent census has been taken this is given and varies from nil (Tobias' caddis-fly) to a cluster of 14.25 million (Monarch butterfly).

Habitat and Ecology: Details of these are given for most species although a few are still unknown. In general a mine of useful information.

Scientific Interest and Potential value: Here the authors are breaking new ground and giving the reason why a species should be saved. Some species are still used as a source of food, others for decoration; some are of great scientific interest and importance.

Threats to survival: Under this heading are given both the actions that have caused the extinction or diminution in numbers, and more importantly, the existing pressures which, unless action be taken, are likely to cause extinction in the near future.

Conservation measures taken: This paragraph lists those measures that have already been taken to preserve a species, such as banning its collecting or export.

Conservation measures proposed: In this paragraph the authors put forward the suggestions for further research that needs to be undertaken in order to find out just what measures need to be taken.

Captive breeding: This is a fairly new approach to maintaining endangered species, in spite of the fact that in some cases it has been undertaken for a least a century. Details are given for those species where it has already been tried or where it might be worthwhile making the attempt.

References: These are very extensive and are laid out clearly and in the numbered sequence in which they are quoted in the text. In both these and the acknowledgements at the end of the reference list, the immense amount of collaboration and help the authors have had in making this databook as comprehensive as possible becomes evident.

From a study of this book it becomes very obvious that the principal danger to any species is habitat alteration, but in some cases over-exploitation, particularly of corals for the carving, jewellery and tourist trade. A few edible species are also becoming endangered due to their being over-exploited as a food source. It is interesting to note that not a single insect is considered to be commercially threatened.

It is instructive to consider some of the conclusions of this so thoroughly researched book. A number of facts and conclusions may well come as a surprise to many. To give a few examples. Tartar's stentor only first discovered in a single pond in 1952 has not been seen there since 1970. It is considered its destruction could well be the result of wild-life management practices. These were designed to attract geese as an attraction for visitors. Their activities had resulted in despoilation and pollution of the pond. So what is right for one species is clearly wrong

for another. Although in no immediate danger, it appears that a potential threat to Horseshoe crabs is their increasing importance in medical research. Attempts to breed them have not so far been successful. The maintenance in an unspoiled state of their habitats is of course of vital importance and provided these can be maintained so too can a steady cropping. Turning to the insects, the authors consider that the greatest present danger to insect species is deforestation of tropical equatorial regions which occupy only 6.3% of the land surface but harbour 50% of the insect fauna. Contrarily, reforestation (usually of coniferous monocultures) in temperature regions also reduces the insect population.

Another threat to the survival of species, particularly on Pacific islands and other restricted areas has been due to the introduction of competing or, even worse, predatory alien species. For instance the Giant Wetas are threatened by, amongst other introduced species, rats, so the best protection for them is the total elimination of the introduced predator, although an attempt has been made to introduce the Wetas to a rodent-free Island. Long considered a delicacy, the European Crayfish have been decimated to the extent of needing, and in most cases getting, protection, not by being over-eaten but by disease known as the Crayfish plague, although other factors such as acid rain and pollution have also had their effect. The case propounded for the Apollo butterfly makes interesting reading. It has been stated a number of times that this species (and/or some of its many subspecies) have been endangered by collectors and dealers. This feeling may have been engendered by its having been the first invertebrate to be included in the appendix to the convention on International trade in endangered species. Laws are in force to protect it (from collecting) in several Countries but are having little effect as the laws do not protect the habitats. An interesting theory, backed up by some facts, (dead specimens along the roadsides) suggests that the butterflies run a greater risk of being killed by cars than of being collected. However, in spite of this suggestion, most observers agree that it is not collectors but ranks of conifers in plantations that threaten Europe's parnassians. So we are back to habitat destruction again.

Surprisingly, the only U.K. insect mentioned in this book is the Large blue butterfly, sadly extinct here but now in need of protection in Europe, habitat destruction again being the chief threat. In a sense this lacunae may be a good sign for although for instance the Mole and Field crickets as well as some dragonflies may well be in need of protection in U.K. their omission hopefully means these species are well holding their own elsewhere, for this book takes a global, not local theme.

This book is an absolute mine of information not only about species under threat but, through its exceedingly thorough documentation (the introductory pages to the Insects list 83 references, and many of the

species have several dozen listed) giving multiple leads to the literature generally, not just from a conservation angle, but to taxonomic, physiological and ecological angles also. Much of what is said in the text can be equally well applied to species not at present under threat and the very considerable further research that needs to be done is brought to our attention. This is therefore a book that should be in the library not only of those dedicated to conservation, but of all who have even the slightest interest, and today that is most of us, in any aspect of insect or indeed invertebrate life in any of its aspects.

Brian Gardiner

L'élevage de Papillons, espèces européennes by E. Friedrich (French translation by U. Gagneron). pp.235, 16 + 2 cold plates, illustrations. 8vo. Sciences Nat., Venette, 1982. Price (Paperback) £20.

This is the French language version of the German edition published three years ago and what a pity it is we have not had an enterprising publisher do us an English version, for this is a very useful and worthwile book for those who can read either this or the original German version.

Firstly, it is worth pointing out that the meaning of the French word 'Papillon' has changed since my schooldays from 'Butterfly' to 'Lepidoptera' and this book covers not just the butterflies but the moths as well and there is also a very small section on the microlepidoptera. It does for the European lepidoptera what the Silkmoth Rearer's Handbook has done for the exotic Saturniidae and follows a similar pattern, but not to the extent of listing all possible species. Some 250 species of which the author has had personal experience in breeding are however all described in some detail.

The first part of 69 pages deals with the basic techniques of breeding, including equipment required, and describes, to us here in U.K., some novel, but effective, methods of killing specimens. Included are useful comments on foodplants and botanical literature.

The book is illustrated with both black and white and a few colour photographs of various butterflies, moths, eggs and larvae which serve to add interest to the text. The second part of the book takes us through the rearing experiences of the author (or his reliable authorities) species by species (or sometimes related groups) and a widespread selection of the European butterfly and moth fauna of all orders is covered. Particular attention is given to those species which are considered generally by Lepidopterists to be difficult or troublesome to rear. Introductory remarks to families and genera are given. In particular the author seems to have remarkable success with the hibernating Zygaenidae. Emphasis is laid on the ease (or otherwise) of obtaining eggs and the difficulties likely to be encountered with the larvae. Since so many adequate descriptions

of species exist elsewhere such matter is omitted and the text is therefore all solid meat on rearing technique. The text gives numerous further references and there is also a bibliography and a suitable index.

Having praised the contents we must now sound a discordant note. For the price this is an expensive book. It is printed on not particularly good quality paper and is, after all, a paperback. It is nearly as expensive as the large quarto format quality production of Lemaire's *L'Attacides Americaines*. The layout and format (double columns on a smallish page size) do not make for particular easy reading and the use of more italic and/or bold type combined with better spacing arrangements would have been distinctly helpful.

S.A.C.

(We understand that the 2nd revised German edition is available from E. W. Classey Ltd. at a price of £12.50 — Editor.)

The Butterflies of Britain and Europe by Lionel Higgins (text) and Brian Hargreaves (Illustrations). pp256, numerous colour illustrations and distribution maps. Collins, London 1983. Paperback £5.50, Hardback £8.50.

The spate of books on British and European Lepidoptera (butterflies in particular) continues unabated and several are now issued each year. This one, as might be expected in view of the authors and publishers, is a condensed version of the Higgins and Riley *'Field Guide'* which has stood the test of time and several issues and editions. Whereas the Field Guide had the illustations on plates with facing legends this book has the illustrations interspersed with the text but sometimes also occupying a whole page, nevertheless, and the colour tinted distribution maps adjoin in the margin, except that there are 57 enlarged British species distribution maps given on the last few pages of the book.

A very unfortunate fact about this book lies in the title, which apart from the word 'The' is the same as that of Alan Watson's book published two years ago and this could well lead to confusion.

While the illustrations and distribution maps are clear enough, the very small type used in conjunction with the most appalling abbreviations in the text, is a great strain both on the eyes and one's mental ability. For instance 'ups' for upperside but 'upf' for upperside (of the) forewing. Such things make horrible reading. Since it was obviously considered imperative to so shorten the text then this reviewer can suggest far better ways of having done it without loss of meaning. For instance, is it really necessary to always say '*Larval* food plants' when it is obvious that no other stage can be involved? Indeed 'FP' would have been an acceptable abbreviation for those three words here. Also 'unknown' is shorter than 'not known'.

It appears that practically all the nearly 400 European butterflies have now received English names, and in this book they take precedence over the scientific. Now many of these names appear to have been coined and we have Grecian this, Moroccan that, Northern whatnot and Southern havenot. It is perhaps time that an effort was made to standardise these names, the most sensible thing to do being surely a translation of the local vernacular name. Such a list already exists in Dr L. Gozmany's monumental work where the names of the whole of the European fauna are given in seven languages. It could also be instructive to compare the names with the previous review of a Czechoslovakian book which has been translated into French.

The distribution maps are easier to follow than those in the Higgins and Riley *Field Guide* where they are both fewer in number, uncoloured, and all collected together. There are additionally several pages of colour illustrations of larvae on their foodplants and an adequate index. The coverage, too, is more extensive, including rare and local species, than the similar book of Watson. It has also found a few more species than are given in the more conveniently sized pocket guide by Paul Whalley (see review *Bulletin* Vol. 40; 166) but omits the dayflying moths so usefully included in that work.

One wonders just what niche this book is intended to fill. It appears to be a downgraded version of Higgins and Riley but improves on that work in its distribution maps. The inclusions of a few larval illustrations while intended no doubt to be helpful do not serve much of a useful purpose since they are artistic rather than accurate representations and there is no doubt that in this field good photographs would have been far better. Indeed, some of these lavual illustrations are incorrect enough to be distinctly misleading. A work of this sort, in view of its intended readers, is also no place to have introduced yet further name changes, which it does in some half-a-dozen cases. With so many such small format guides now on the market, there is perhaps little to choose between them except personal choice after considering them together in a bookshop.

Brian Gardiner

DRAGONFLIES FEEDING ON BUTTERFLIES

Being a keen conservationist and owning a large garden, an acre and a half of mixed scrubland, I have had three ponds dug for the benefit of the wildlife. The natural influx of species has been rapid, and includes four Damsel flies and five Dragonflies.

Last week, beginning 10th July 1983, there was a massive hatch of Marbled white (*Melanargia galathea* L.) in our district of Cranmore near Yarmouth on the Isle of Wight. In a walk along 150 metres of field headland I counted 86 individuals, many of which I put up as I passed.

While visiting the pond we had dug in the scrubland I noticed several Marbled white wings floating on the surface. My first thought was that they had drowned, but the fact that they were dismembered made me think predators were the more likely cause of death, and I suspected dragonflies.

The following day my suspicions were confirmed when in front of my eyes a male Emperor (*Anax imperator* Leach) took a Marbled white on the wing. This was two hundred yards from the nearest pond, but *Anax* is common here, particularly this year. The dragonfly alighted after a few seconds on some grass and was so engrossed with his catch I was able to approach to within arms length to observe his behaviour. The hapless butterfly was manipulated so that the head faced that of the dragonfly, then starting at that end the whole of the body of the butterfly was consumed, the wings falling away. After a few seconds cleaning the dragonfly then took off once more to patrol.

Unconnected with this event, but concerning *Anax*, I frequently observe this insect patrolling over a large sheet of black horticultural polythene, obviously under the impression it is a pond. This polythene also fools many other aquatic species when we lay it out each Spring. Assorted water beetles and water boatmen land on it and try in vain to swim. They will often persist for half an hour before giving up and flying away.

N. Poulter (7767)

PLEASE RECORD YOUR DATA

Having just read the article by Mr Gross advocating the use of photographic paper for data labels, I am once again driven to put pen to paper and send off a plea for common sense in recording data.

Working in Local Authority Museums I have seen far too many reasonably complete collections — almost always of macrolepidoptera — in excellent condition complete with numbers of varieties, male, female and undersides, larvae, pupae and so on, but NO DATA or a meaningless code affixed to the specimens. Such collections are, alas, scientifically near useless, but do serve as a good source of 'disposable' specimens to put out for school loan, display or some other use in which the specimen invariably gets ruined. 'Such a waste' you might think, well, the waste lies not with the use these specimens are put to by the Museum (a lot of people get a lot of use from them before they get broken or eaten by pests) but with the collector. If only a little time had been taken to put data labels with locality, date and captor . . . a life-time's hobby gone to waste.

I cannot help but think that photographic paper (expensive as Mr Gross points out) being, by its very nature, light sensitive will blacken over the years, fair enough one can read black ink on very dark grey! Why not use plain index cards, post cards or heavy quality writing paper? Indian ink or a modern non-fading waterproof equivalent is indeed necessary, ball-point ink should be avoided at all costs as it is affected by naphthalene or paradichlorobenzene fumes and if put with the specimen into a degreasing bath vanishes at once! Other 'fountain pen inks' do not seem 100% permanent, but lead pencil is a very good substitute for Indian ink, it too resists chemical action.

As a parting shot can anyone explain another pecularity of Lepidopterists (or should I call them butterfly and moth collectors?). This is the placing of data labels upside down (i.e. with the writing facing away from the eye). Workers in all other Orders seem loathe to keep handling specimens so put the data 'face up' so that it can be read without having to remove the insect. Perhaps it has something to do with the Lepidopterists traditional 'English' low mounting as opposed to the almost universal preference for 'continental' pins in most other Orders (subject to one's cabinet/store-box dimensions).

J. Cooter (3290)

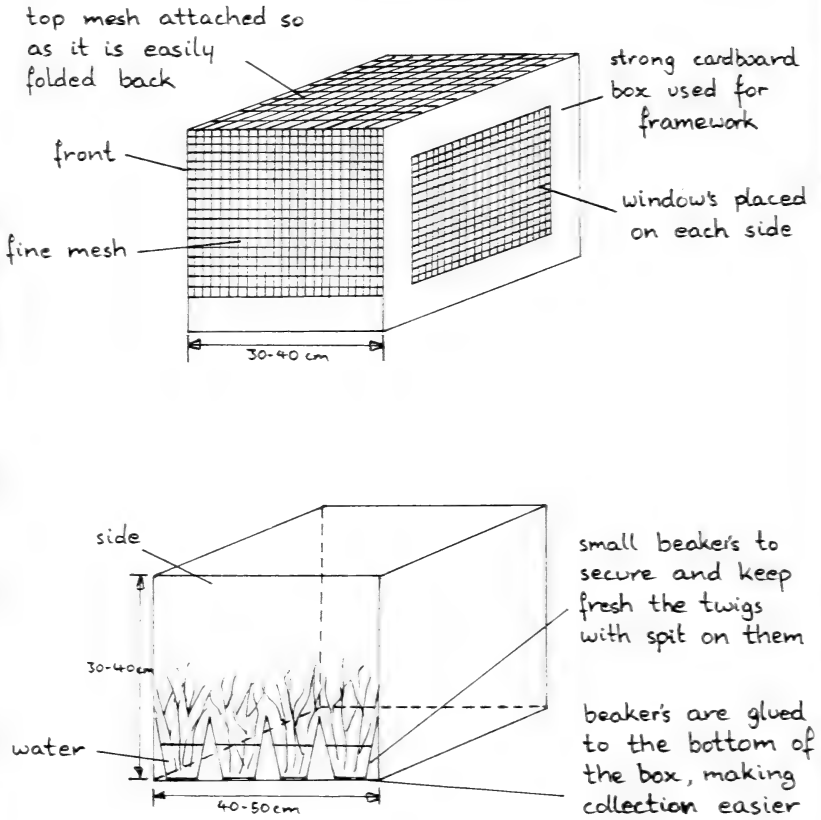
THE SPIDER'S SONG

Look upon my web so fine,
See how threads with threads entwine;
If the evening wind alone
Breathe upon it, all is gone.
Thus within the darkest place
Creative Wisdom thou mayst trace;
Feeble though the insect be,
Allah speaks through that to thee.

As within the moonbeam I,
God in glory sits on high,
Sits where countless planets roll,
And from thence controls the whole:
There, with threads of thousand dyes,
Life's bewildering web he plies,
And the hand that holds them all
Lets not even the feeblest fall.

From the Danish of Ochlenschlager.

FIG. 1. THE EMERGENCE TRAP.



THE POLYMORPHISM OF PHILAENUS SPUMARIUS

Summary

Philaenus spumarius shows a large range of colour patterns, but with no distinct groups. The twenty-four groups can be identified and split up into four distinct series. It appears that the frequencies of the series may be related to the host plants (and possibly other aspects of the environment, including altitude). *P. spumarius* seems to illustrate an unstable polymorphism, as different locations are heterogenous.

Introduction

P. spumarius L. (the common froghopper, or spittlebug) has an interesting case of colour polymorphism (meaning the presence of several different forms of the same species), controlled genetically by an allelic set. It belongs to the order Hemiptera, family Cercopidae. This homopterous bug is a very common insect of many Nearctic and Palaearctic grasslands and is a serious pest of certain crops in many parts of its range.

Originally the many colour forms were assigned to different species. But it is now recognised that there is only one species with a number of varieties.

The purpose of this work is to investigate the range of these colour forms on the south-west edge of Dartmoor, and to see if the frequencies are related in any way to the environment.

Materials and Methods

I used an emergence trap to collect my samples and this is illustrated in Fig. 1.

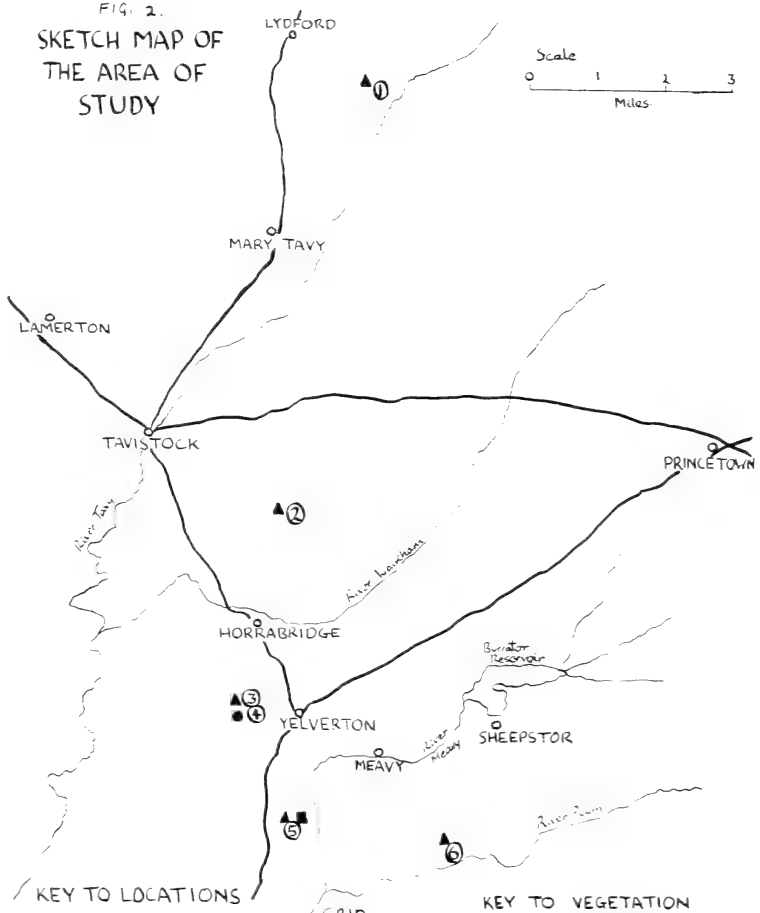
They can be easily collected in pre-adult life, because they protect themselves by forcing air into a fluid exuded from the anus (hence the term spittlebug). Hence they can be collected by cutting twigs containing this spit.

This method has advantages in that morphs from known host plants can be analysed, and it is more likely that actual numbers of each morph will be caught than a sweep net method. Another significant advantage is that it is known (from work by Halkka) that some of the morph frequencies vary during the season. But the emergence trap method overcomes this problem, if samples are collected as the first adults emerge and continued until the end of the season. A true representation of the population is thus obtained.

Twelve traps were constructed, and samples collected during the last two weeks in July and the first two in August, 1981, when the adults were beginning to emerge. Each adult had to be classified into its respective group, which is a difficult task because it seems that many of the groups

FIG. 2.

SKETCH MAP OF THE AREA OF STUDY



KEY TO LOCATIONS

	NAME	ALTITUDE	GRID REFERENCE
①	LYDFORD	275	82,52
②	PLASTER DOWN	210	72,51
③	YELVERTON-MOORS	200	68,51
④	YELVERTON-GARDEN	230	68,51
⑤	CLEARBROOK	170	65,51
⑥	CADOVER	230	64,55

KEY TO VEGETATION TYPE AT EACH LOCATION.

▲ GORSE
■ HEATHER
● GARDEN PLANTS

merge together. A magnifying glass had to be used in some cases. A few insects in each group were killed and preserved for further analysis.

Study Areas

Samples were taken from six different locations on the south-west edge of Dartmoor, as shown in Fig. 2, taken from the Dartmoor Ordnance Survey Map. The diagram also includes the vegetation type at each location.

Separation of Colour Forms

The specimens were initially classified into twenty-four different groups, as illustrated in Figs. 3 and 3A, as I thought each group was different in pigmentation or marking. The illustrations shown are the most typical in that particular group, as variations occur.

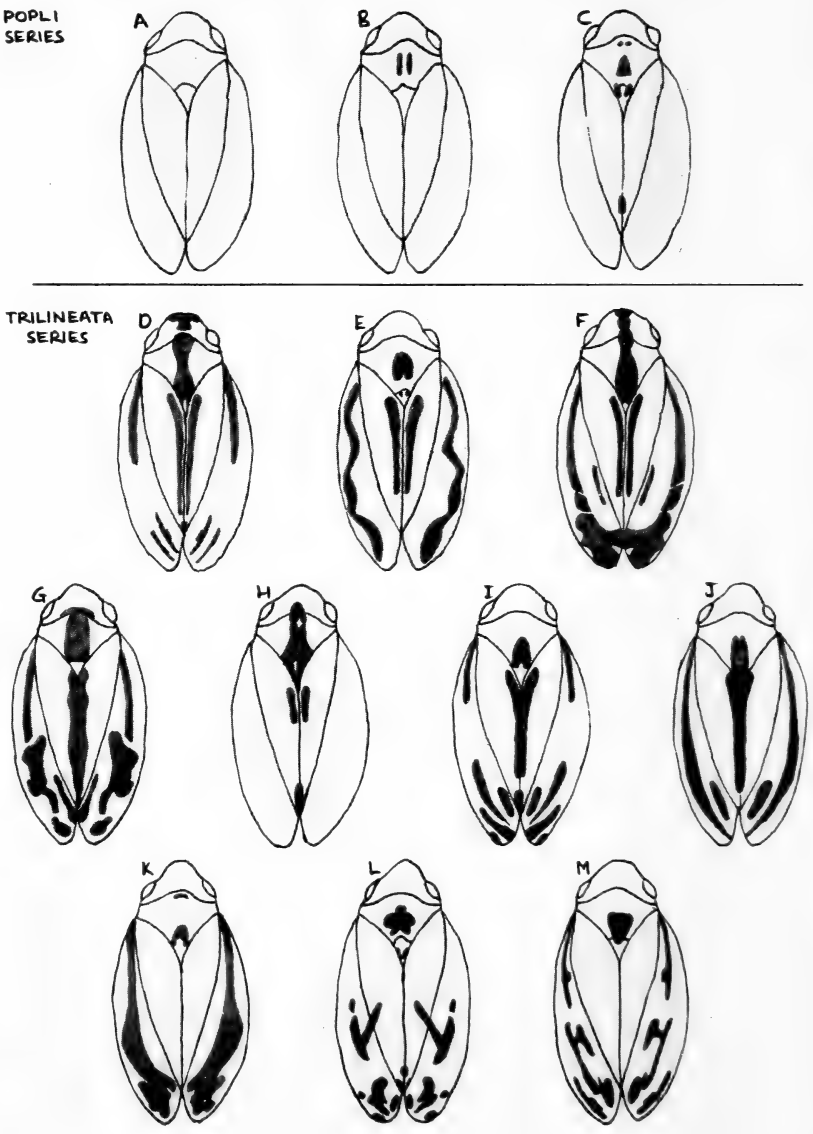
Both Halkka and Whittaker who have carried out work in Finland and the north of England respectively have classified their morphs into eleven varieties, to which they have given names. My classification corresponds to theirs as in Table I.

Table I

Name given to variety by Halkka and Whittaker	Corresponding group in my classification
trilineata	D, E, F, G, H, I, J, K, L, M
marginella	U
lateralis	V, W
typica	N, O, P, Q, R, S
flavicollis	None (possibly N and R)
quadrimaculata	T (possibly O)
gibba	None
albomaculatus	None
leucocephalus	None
populi	A, B, C
leucophthalma	X

The greatest variation in my classification and theirs seems to be in the *trilineata* variety which I have split up into several different groups. I am not certain which variety to place groups N, R and O, as they do not correspond directly to any of their varieties.

FIG. 3. ILLUSTRATIONS OF EACH MORPH.



In my illustrations (Figs. 3 and 3A), I have split them up into four series:—

1. *populi* — unpigmented, straw coloured:
2. *trilineata* — with a black/brown stripe along the junction of the elytra, and some also with an outer stripe along the radial and medial veins of each elytron:
3. *typica* — a pale/dark ground with a 'zig-zag' pigmentation;
4. Others — the rest are placed in this series which includes individuals with the elytra entirely dark brown or black.

Whittaker suggests that intermediates occur between *'populi'* and *'trilineata'*, which I have classified as separate groups in B, C, L and M. L and P could be said to be intermediates between the *'trilineata'* and *'typica'* series.

I must agree with Whittaker who says 'the whole process of dividing the species into these distinct forms may need revision' (p.101 *J. Animal Ecol.* 37), because of the seemingly continuous variation and merging of forms.

The morphs may not be equally represented in the two sexes, but I have not taken this into account.

Results

My results differ greatly from Halkka's in Finland, where the frequency of *typica* is about 90%. But the frequencies of the four series compares well with some of Whittaker's data from the north of England (who has used a similar method of classification into the four series). The results obtained are shown in the bar charts, Figs. 4 and 5.

I have carried out some chi-squared tests on my data, although they should be a measure of the discrepancy existing between observed and expected frequencies. Therefore we have to take the mean or one location as the expected frequency, which questions the validity of the tests. For my tests I have used the actual numbers collected instead of the frequencies, and just used the four series instead of the twenty-four groups. Hence the number of classes is four and degrees of freedom three. If the twenty-four groups were used, the samples taken would appear too small to apply this statistical test successfully.

Table II shows the probability that chance alone could produce the deviation from the mean at each location.

FIG. 3 A.

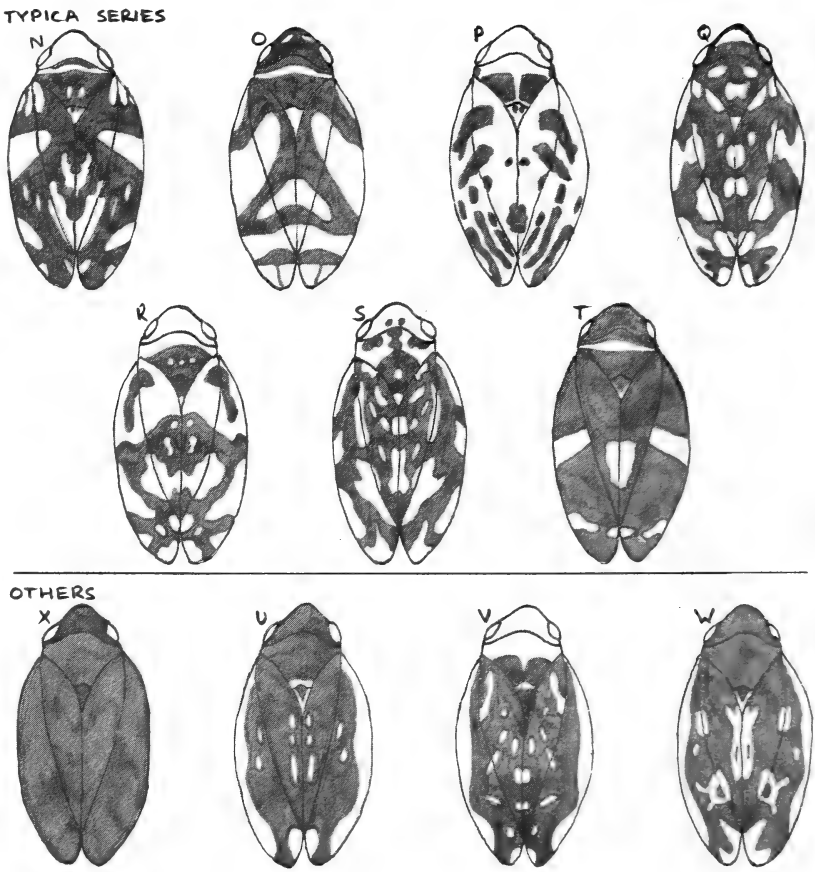


Table II

Location	Results of chi-squared test
Yelverton — moors	$X^2 = 4.99$, P 17%
Yelverton — gardens	$X^2 = 2.52$, P 45%
Cadover	$X^2 = 4.25$, P 22%
Clearbrook	$X^2 = 12.47$, P 0.6%
Plaster Down	$X^2 = 7.68$, P 6%
Lydford	$X^2 = 5.81$. P 12%

Hence Clearbrook has the most differing set of numbers from the mean, which corresponds to it being the only place where the *trilineata* series has a greater frequency than the *typica* series. A reason could be that samples were collected from gorse and heather. The results show that at Yelverton-gardens, it is least unlikely that chance alone could produce the deviation. Although maybe we should not compare Yelverton-gardens with the rest because a range of host plants were used.

Probably a more useful application for these tests is to see which of the other five locations corresponds closest to each location. The following results were obtained, again just using the four classes of data.

Pairs of locations with results the most similar:—

Yelverton — moors
Plaster Down — $X^2 = 4.84$, P 18% (taking Yelverton — moors as expected)

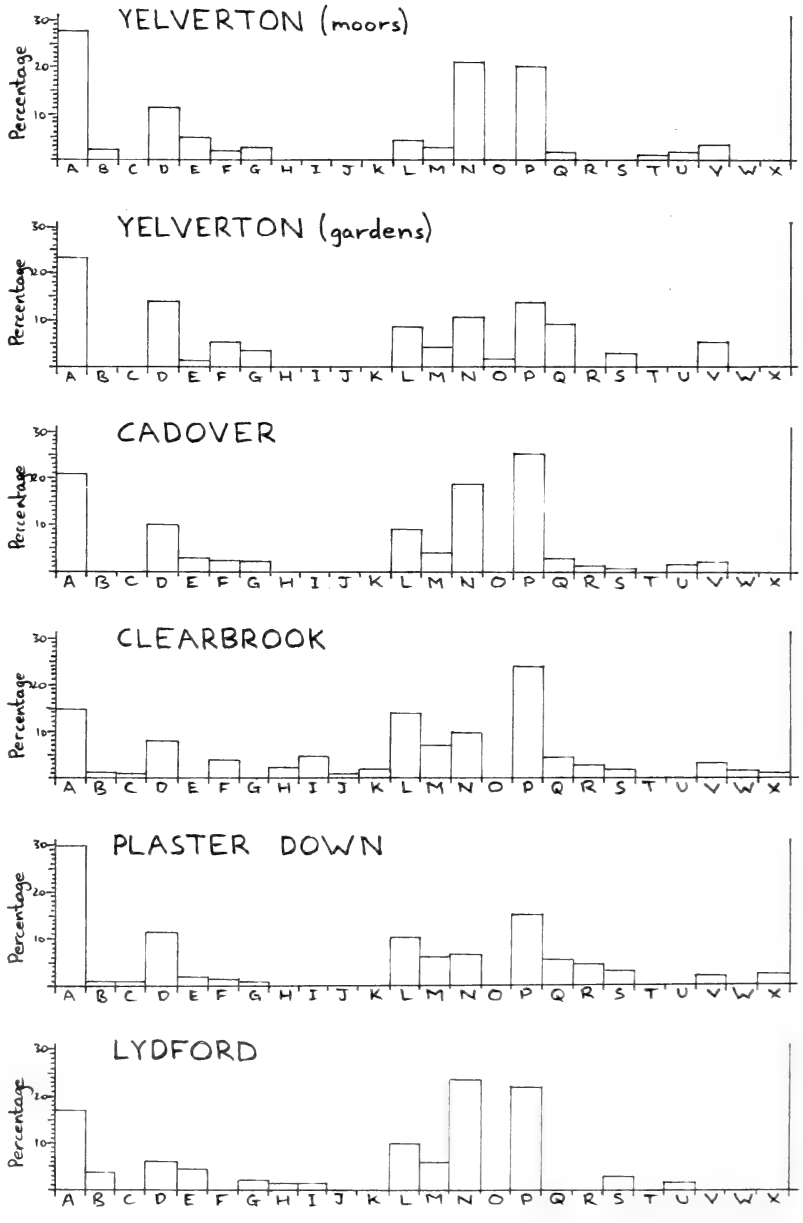
Yelverton — gardens
Clearbrook — $X^2 = 5.22$, P 17% (taking Yelverton — garden as expected)

Cadover
Lydford — $X^2 = 1.68$, P 65% (taking Cadover as expected)

It does not matter what location we take as the expected numbers, the same pairs are produced.

From these results the only locations which would appear to be homogenous are Cadover and Lydford. This could be related to their similar environments (in that they have the two highest altitudes and are close to rivers compared to other places). The two places where samples were not entirely taken from gorse are shown to be the most closely related to each other. Yelverton — moors and Plaster Down also have similar environments in that samples were taken from gorse bushes exposed on the open moors, whereas at Cadover and Lydford, samples were collected from sheltered positions.

FIG. 4. BAR CHARTS SHOWING THE PERCENTAGE OF EACH MORPH AT THE SIX LOCATIONS.



Whittaker says 'in the case of both sexes there are significant differences in polymorph ratios between the collections' (*J.Anim. Ecol.* 37 p.102). Hence he found his locations to be heterogenous as I have except for Cadover and Lydford.

But the relevance of these chi-squared tests has to be questioned, due to no real expected frequencies and the results would be completely altered if there was a change in the method of separation of colour forms.

Having seen the similarity in Cadover and Lydford with their high altitudes, I have decided to look more closely at the effect of altitude differences. Table III shows the numbers of the *'trilineata'* and *'typica'* series (with percentages in brackets), in descending order of magnitude of altitude.

Table III

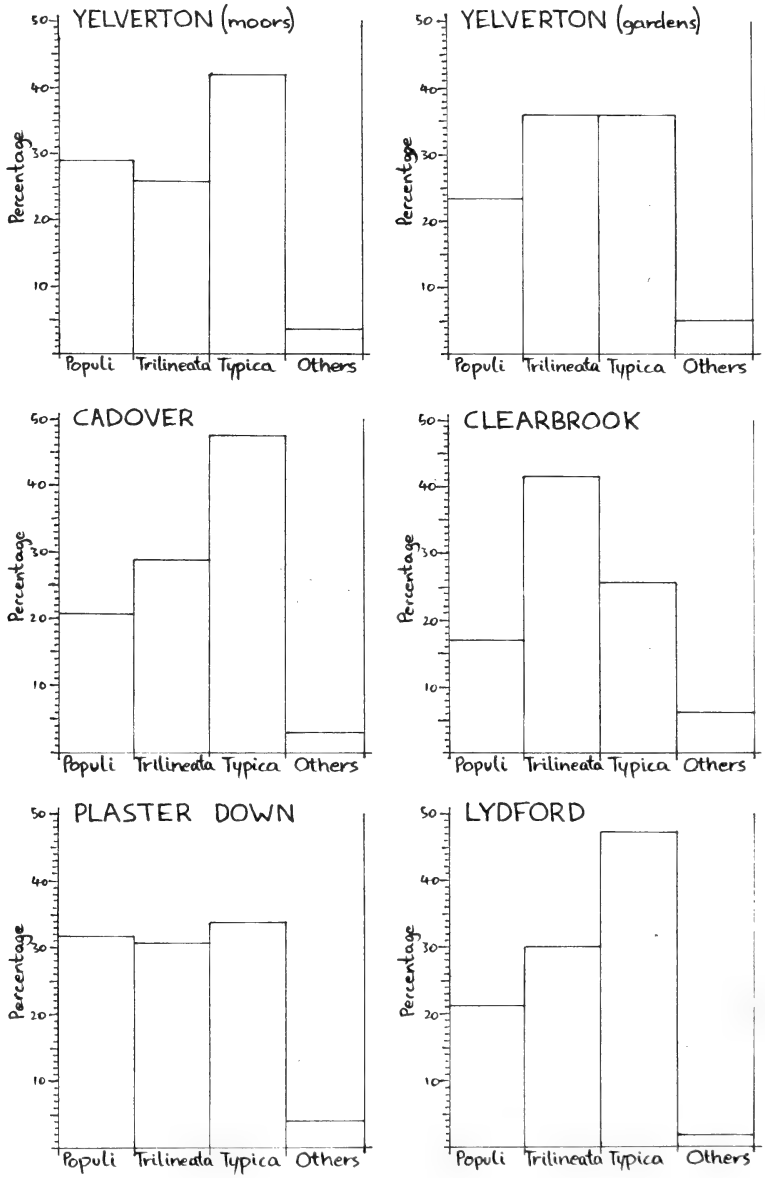
Location	Altitude metres (feet)	Numbers of the *'trilineata* series'	Numbers of the *'typica* series'
Lydford	275(900)	61(30.0)	96(47.5)
Cadover	230(750)	58(29.0)	95(47.5)
Plaster Down	210(700)	59(30.6)	65(33.7)
Yelverton (moors)	200(650)	52(25.9)	84(41.8)
Yelverton (garden)	200(650)	68(35.8)	68(35.8)
Clearbrook	170(550)	86(41.3)	74(35.6)

From the table, with the exception of Yelverton — moors, we can see that as the altitude decreases, the numbers (or percentages) of the *'trilineata'* series increases, while the numbers of the *'typica'* series decreases. But these proposals are tentative and further work is required for any firm conclusions.

Discussion

Whittaker found that similar habitats within a small area appear to have similar proportions of morphs, as shown by Cadover and Lydford. He also finds that different host plants in the same area have different proportions of adult types associated with them. This is also shown in my results by Yelverton moors and garden, where there are significant differences in the frequencies of the four series of morphs. Although this would be more conclusive if I had collected samples from just one host plant in the garden, as it seems the frequencies obtained are a result of the combination of frequencies from different host plants. This theory is also supported by Clearbrook, where insects were collected from gorse and heather, and from the chi-squared test it had the most different proportions of morphs. Halkka has also shown this phenomenon in Finland.

FIG. 5. BAR CHARTS SHOWING THE PERCENTAGE OF EACH SERIES AT THE SIX LOCATIONS.



From evidence already available it seems the polymorphism of *P. spumarius* may be ecologically as well as genetically controlled. The fact that different host plants in the same area have varying frequencies, could be a straightforward physiological affect where melanin (pigment which in different concentrations gives brown and yellow colourations) production varies with the food plant, or partly a result of differential survival of different varieties on different plants.

Whittaker and Halkka both mention it to be a balanced (stable) polymorphism, in which the different morphs or the alleles responsible for them occur in fairly constant proportions within a given population whose members are freely interbreeding. The stable polymorphism is achieved by a balance of relative advantages and disadvantages, each morph being favoured by natural selection in the particular conditions that occur within a varied environment.

We have a varied environment in Yelverton moors and gardens where if the statistical tests are valid it seems that the morphs do not occur in constant proportions. Even with a similar environment in Yelverton — moors and Plaster Down (assuming that the populations are freely interbreeding) there are significant differences between the frequencies recorded.

Therefore, maybe in south-west Dartmoor we have an unstable (transient) polymorphism, in which a genetically controlled morph is in the process of spreading through a population, so its numbers as compared with other morphs will be changing. Maybe this is being shown in the changes in frequencies with altitude. *P. spumarius* is possibly going through a period of unstable polymorphism as in *Biston betularia* L. (Peppered moth) where the transient polymorphism has now become uniform. Dr D. Lees has found real signs of industrial melanism in South Wales, which has previously been associated with *B. betularia*. By this he means that my group X, for example, a dark form, has a high frequency due to natural selection by predation of the froghoppers against a background of blackened vegetation. *P. spumarius* might be going through a period of rapid evolution as in *betularia*. On the other hand, I might be dealing with several different populations and hence I do not like to come to any firm conclusions as to whether we have a stable or unstable polymorphism.

The control of the frequencies in a particular area is most probably due to visual selection, such as predation by birds as suggested by Halkka. Whittaker has carried out work on this hypothesis, although at his sites he found predation insufficient or not selective enough to provide an explanation of the polymorphism. He did find that the parasitoid *Verrallia aucta* Fallèn is a source of mortality at his sites, but it sterilizes its host without removing it from the population until the end of the season, and therefore it is very difficult to investigate its effects.

Obviously in my area of study there is probably a totally different predator involved in the polymorphism.

Although these differences may seem insignificant, it is thought that they may be associated with other more important differences, such as viability and reproductive efficiency, on which natural selection can operate, and hence causing evolution. For instance the biochemical pathway producing melanin may be linked with another much more important biochemical process such as the Krebs Cycle for instance (controlling the essential oxidation of carbohydrates to ATP, which is a source of energy). Hence a change in colour pattern might indicate a much more important internal change, which is controlled by the genetic make-up of the individuals.

Future Work

This work has resulted in the emergence of some interesting ideas. But firstly I feel that a whole new method of separation of the morphs needs to be devised, because of the seemingly continuous range of colour and markings.

The altitude factor could be investigated by taking places with similar environments and host plants, but at say fifty metre intervals in altitude. We could investigate how the frequencies of the morphs vary during the season, and try and find a reason.

A longer term study would be to investigate if the morphs are in the process of spreading through a population, by taking samples over a period of say three years from the same location and seeing if there are any significant changes in frequencies.

Another very interesting piece of work could be carried out on host plants. Two host plants could be taken in the same environment with significant differences in the frequencies of morphs. Now fourth or fifth instar nymphs could be transferred to the other host plant (cleared of all its nymphs) on which they can complete their development. Then it could be tested if the frequencies emerging from the plant are significantly different from the normal frequencies. In fact Whittaker has carried out some work similar to this.

N. G. J. Farnham

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A METHOD FOR REDUCING DAMAGE TO SMALL MOTHS IN THE MOTH-TRAP

The Problem

The invention of the Robinson Mercury-vapour moth trap has proved invaluable to many Lepidopterists as a method of obtaining large numbers of moths for a variety of scientific reasons. However, due to the nature of some of my researches, I have found it has one considerable drawback. Because it attracts moths indiscriminately, and is very efficient, on 'good nights', the trap becomes very crowded with the result that the smaller moths often suffer considerable damage caused by the movement of the larger moths. This is particularly inconvenient to me as it means that moths of the family Geometridae are often 'worn' to such an extent that they become impossible to identify except by microscopic examination of the genitalia. As my main interests in these smaller moths are concerned with the control of larval and imaginal variation, my researches require living moths, particularly mated females, which can be identified without resort to microscopic techniques. Furthermore, keeping a photographic record of moths used for breeding purposes loses much of its usefulness if the parents are badly worn when they are photographed. As it seemed that Noctuid species such as *Noctua pronuba* L. and *Agrotis exclamationis* L., which are particularly abundant in the trap in the Summer, when it becomes most crowded, are the principle cause of such damage, various methods of excluding some or all of the larger more robust species from the trap were considered. Attempts to prevent the larger moths entering the trap whilst still permitting smaller species to do so proved fruitless. Therefore, a method of removing the larger moths from the trap during the night without losing the smaller species was sought.

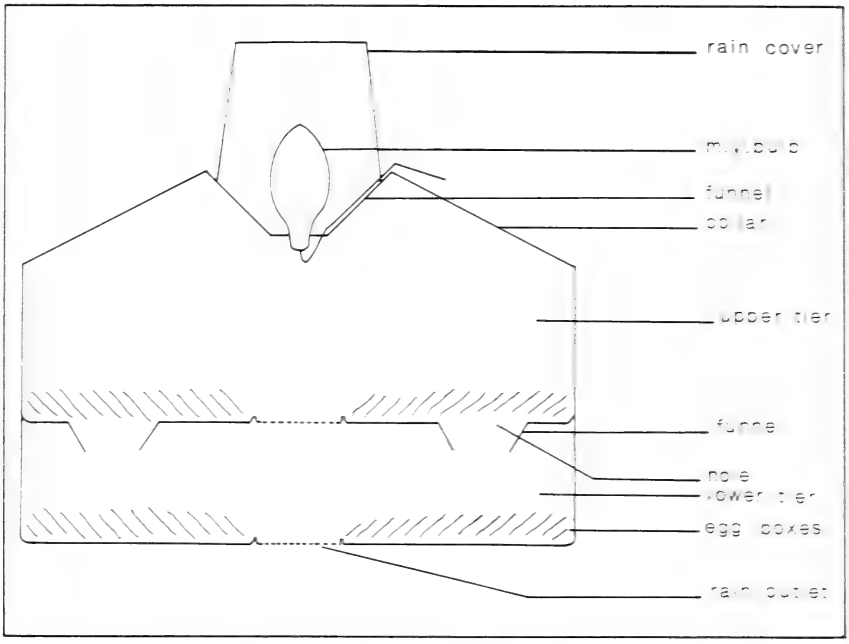
A Solution

The method which I now employ involves the use of a standard Robinson m.v. light trap with two holes, each of three inches diameter, cut into the base of the trap-bowl. The trap, when running, is set up on bricks (which must not be directly beneath the holes), with egg boxes spread out over the bottom of the bowl (and across the holes).

This modification was devised as a result of the observation that many of the Noctuid species are rather restless once in the trap, and they scurry around the bottom. The holes were intended as a means of escape for these moths. (When necessary, the holes can easily be covered with netting or with a piece of plastic.)

A Survey to test the Modification

A survey was carried out to determine the effect of the holes on the catch composition, by running an unadapted trap with the adapted one over a



period of six weeks in July and August, 19[illegible]. The two traps were set up, out of sight of one another, some 500m apart, their positions being reversed in a random manner.

The results showed that all families of 'macro-moths' were taken less in the adapted than the unadapted trap. However, the reductions for different families were variable. The catch reductions for each family in the adapted trap, compared with the unadapted trap (given as a percentage of the number of the same family in the unadapted trap) are given in Table 1.

These figures show that by far the most significant effect of the adaptation was the drop in the number of Noctuids. Furthermore, the reduction in the number of individuals of the *Agrotis* and *Noctua* genera, which I considered to be the two most destructive genera in the trap, because of their numbers, robustness and restlessness, was even more pronounced than the overall drop in the numbers of Noctuids, being 74% for the *Agrotis* spp. and 86% for the *Noctua* spp. The fall in the number of Geometrid moths was due mainly to a reduction in the numbers of some of the larger species of the family such as *Biston betularia* L.

The trap modification also caused a great reduction in the number of Coleoptera which were taken. This was beneficial as it is likely that these robust insects also cause damage to small delicate species of moth. In

Table 1
The percentage drop in the number of specimens of the major families of 'macro-moths', and some other groups, taken in the modified trap compared with the unmodified trap, over a six week period in July and August 1977. (Trapping was carried out in the grounds of the Department of Zoology, Royal Holloway College, Egham, Surrey.)

HEPIALIDAE	18%
LIMACOCHIDAE	25%
COSSIDAE	15%
GEOMETRIDAE	11%
SPHINGIDAE	10%
NOTODONTIDAE	28%
LYMANTRIIDAE	21%
ARCTIIDAE	15%
NOLIDAE	5%
NOCTUIDAE	63%
COLEOPTERA	71%
TRICOPTERA	7%
HYMENOPTERA	3%

fact the reduction in the numbers of the larger species of beetle such as *Necrophorus humator* Goez and *Geotrupes stercorarius* L. was even more marked, being 94%.

On the other hand, it may be noted that the holes had very little effect on the numbers of Tricoptera and Hymenoptera taken.

This method, then, is for my requirements most successful, and in fact the number of virtually perfect Geometrid imagines in the adapted trap during the six week survey was 186% greater than the number in the unadapted trap, whilst the corresponding figure for 'micro-moths' was 198%.

A Further Modification

Undoubtedly, some of the moths which drop out of the holes in the bottom of the trap subsequently re-enter the trap at the top. Also it is recognised that other workers may have slightly different requirements, so an additional modification which would make the system more effective may be suggested. A second bowl could easily be attached underneath the original trap bowl. This in effect would produce a two-tier trap, the lower tier trapping mainly the larger more active species, and the upper tier the smaller more delicate species. A pair of small plastic cones could then be attached to the underside of the holes to prevent the majority of moths which go down into the lower tier flying back into the upper part. Such a modification would produce a greater number of perfect insects without any reduction in the overall catch size.

M. E. N. Majerus (4027)

COLLECTING HINTS

These are reprinted from earlier Bulletins and have been selected for us by member Mark Walker (6909). They are still relevant, and perhaps members would like to send us their recent collecting hints along similar lines.

Editor

1) The coleoptera in November

(from *Bulletin* no. 227, November 1959)

A large number of different species of beetles are to be found in fungi, and they can be looked for at any time of year. Late autumn, however, is a time when fungi are plentiful and the coleopterist will find it convenient to spend some time collecting from them now. The method is simply to pull them to pieces over a sheet, remembering that more beetles will be obtained from fungi which are past their best condition. Fresh ones do not yield much.

Toadstools often have on or in them a number of species of Staphylinidae, including *Oxyporus rufus* L. and various species of *Lordithon, Atheta, Bolitochara, Quedius* and *Oxypoda* to mention only a few. The fungi which grow on dead or dying trees provide a much greater variety of beetles, some of which are species of *Tetratoma*, *Triplax*, *Agathidium*, and *Dorcatoma*. One of the commonest of these tree trunk species is the bracket-fungus *Coriolus versicolor* (L. ex Fr.). This is the food of most members of the family Cisidae. The very common *Cis boleti* (Scop.) occurs in it, but it also harbours other rarer species of *Cis* as well as the related genera *Ennearthron* and *Octotemnus*. *Cis bilamellatus* Fowler is an introduced beetle which was at one time rare but is now becoming common and spreading rapidly. It can be found in the fungus *Piptoporus betulinus* (Bull ex Fr.) which grows on dead birch trunks. Puffballs have their own special beetles which include *Pocadius ferrugineus* (Fab.), *Lycoperdina bovistae* (Fab.), *Cryptophagus lycoperdi* (Scop.) and species of *Caenocara*.

Many of the beetles mentioned here can easily be reared from fungi in which their larvae are present, merely by keeping the fungi in a covered jar and waiting for the beetles to emerge. Another good practice is to collect a handful of fungi and place them in a sheltered position where they can be examined from time to time and the beetles which have been attracted to the decaying mass can then be collected.

Finally I would like to point out that what is commonly called a fungus is only the reproductive part. The rest of the plant consists of white, thread-like hyphae which form a network either under the ground or under the bark of trees. Therefore many of the fungivorous beetles can be taken in fungus-infested soil or rotten wood or under the bark of fungus-infested tree trunks.

K. C. Side

2) The smaller moths in December
(from *Bulletin* no. 240, December 1960)

The stems of wormwood, *Artemesia absinthum* L. may be collected for the larvae of *Euzophera cinerosella* Zell. (I am not too sure about the conservation aspects of this now. — M.W.). The larva works its way up the stem until it reaches near to the end of the shoot: the moth emerges in May. However, this moth is restricted to the southern coastal counties, including Norfolk.

For members in, or likely to visit, the north-west of England, collecting the stems of the balsam, touch-me-not, *Impatiens noli-tangere* L. may produce the larvae of the local tortricid, *Pristerognatha penthinana* Guen.

Again in southern coastal areas the stems of wild cabbage, *Brassica oleracea* L. (and also Brussel Sprouts) may be examined for signs of frass, revealing the presence of the larvae of *Selania leplastriana* Curt. within the stems.

The stems of thistles, *Carduus* spp etc. may be examined for the larvae of *Myelois cribrella* Hubn., *Aethes cnicana* Westwood, and *Epiblema foenella* (L.). Make sure that you wear a pair of tough gloves for this operation; a sharp knife or a pair of side-cutters may be used for cutting off the stems and carefully splitting them open.

Do not forget to keep an eye open for moss, and to examine it for signs of lepidopterous larvae, also to collect oak galls, bird's nests, etc.

D. Ollevant

NOTES AND OBSERVATIONS

Carolina Arthropods Manual — This manual is issued by the Carolina Biological Supply Company of 2700 York Road, Burlington, N.C. 27215, USA, and is issued with each purchase of any Arthropod livestock (which is extensive) listed in their sumptuous colour catalogue. Basically, it gives a brief illustrated outline of the rearing methods advised for the stock they supply and is primarily designed as a back-up for schools use. For most species it very usefully gives the references where more detailed information may be found.

Quite half of the species given are also readily available in Europe and another quarter are USA species which are already widely bred in European schools and Research Laboratories. Besides moths, butterflies, crickets, cockroaches, flies, ants, beetles, bugs and dragonflies, there are items on woodlice, crayfish and crabs, spiders, shrimps and daphnia.

Altogether a useful little booklet of 36 pages. Most species listed can be shipped safely to Europe and we know from personal experience that they arrive safely, the only disadvantage being of course the high cost of the airmail postage.

Editor

Offshore Islands well catered for — There has recently been a great revival of interest in the insects of our offshore Islands. A recent paper, edited by P. Wormell (The Entomology of the Isle of Rhum National Nature Reserve. *Biol J. Linn. Soc.* Vol. 18 (1982), pp. 291-401), consists of over 100 pages and lists over 2000 species (10% of the British total) discovered principally as the result of intensive surveys in the 1960's but of course including all other documented records. This list could well show the way and draw attention to what might be found on other Hebridean and Shetland Islands if sufficient attention were paid them. Also due for publication at the time of writing is 'A Bibliography of the Entomology of the Smaller British Offshore Islands' by K. G. V. Smith and V. Smith, which we understand has been in preparation for some twenty years and should, therefore, be a detailed guide to what can be found and what still needs to be searched for on our very numerous offshore islands and islets. Indeed, from the first above-mentioned work it looks as if some butterfly species might be commoner on Rhum than they are on the mainland, for is it not likely that such areas have been subjected to the same pollution and habitat destruction as our more populous areas.

A third work, published as we go to press, is R. J. Lorimer's 'Lepidoptera of the Orkney Islands'. As intended this work covers recent intensive investigation and we shall publish a review in a future Bulletin.

Editor

An interesting Incurvariid in Cornwall — Although many species of Lepidoptera got off to an abnormally slow start in 1983, because of the unseasonably cold Spring weather, a surprising exception in a wood near St. Blazey, Cornwall, was *Phylloporia bistrigella* Haw. A number of vacated mines of this species were found on sapling birch trees (*Betula pubescens*) on 29th June 1983, and despite diligent searching, no occupied mines could be found. The larvae of *bistrigella* usually feed in July in mid-Cornwall, and freshly-vacated mines are most often found in late July or early August.

It is surprising that Volume 1 of *'Moths and Butterflies of Gt. Britain and Ireland'* omits vice-county 2 in the distribution of this species, which is moderately common in this part of Cornwall.

John L. Gregory (4116)

Some July butterflies on Buddleia — Perhaps due to its not having been pruned last year, the buddleia in my Cambridge garden came into flower early this year and for the first half of July remained bereft of butterflies, when on the 16th a Meadow brown (*Maniola iurtina* L.) appeared. In a few days this was followed by all three of the whites (*Pieris brassicae* L. *P. rapae* L. and *P. napi* L.) and the ubiquitous Small tortoiseshell *Aglais*

urticae L.) in small numbers. The two most interesting sightings, however, have been that of the Comma (*Polygonia c-album* L.) on the 25th and during the last few days of the month Painted Ladies (*Cynthia cardui* L.) and Red Admirals *Vanessa atalanta* L.) put in an appearance together with the much commoner Peacock (*Inachis io* L.) and a single male Brimstone (*Gonepteryx rhamni* L.) on one afternoon only.

Brian O. C. Gardiner (225)

Clouded Yellow on Ivinghoe Beacon — While on a visit to this locality on 12th June I sighted a specimen of *Colias croceus* Geoff.

David Dunbar (7364)

Clouded Yellow in Essex — Whilst lunching in a picnic area at Wat Tyler Country Park in Basildon on July 6th, my colleagues and I were surprised to see a Clouded Yellow (*Colias croceus* Geoff) fluttering past. It appeared to be a male in fresh condition. The area is about three miles from the Thames estuary coast, and is rich in Clover, Melilot and Birdsfoot trefoil.

C. J. Gardiner (5249)

Have there been more Clouded Yellows? — Further verbal reports, without details, have come to the ears of your editor. He has appealed before, and does so again, for short notes and observations to put in this section of the Bulletin.

Curious oviposition choice of Holly blue — On the 30th July 1983, while exploring a disused railway line near Taunton, I observed to my surprise, a Holly blue butterfly (*Celastrina argiolus* L.) busily ovipositing on the small greenish flower buds of a Buddleia bush despite the abundance of its more usual foodplants growing nearby. I followed the butterfly for a while and collected several eggs which were laid singly, with great precision, on the flower stalk deep into the bud.

Have any members made similar observations?

Steven Chapple (7477)

A rare Red Admiral variety in Nottinghamshire — I was very pleasantly surprised to come across a most unusual Red Admiral (*Vanessa atalanta* L.) recently and on looking through my books it most nearly matches ab. *klemensiewiczi* Schille, as depicted in A. D. A. Russwurm's *Aberrations of British Butterflies*. Even more unusual, however, is the fact that it appears to have duplicated antennae, the second pair being feathered like a male Saturnine moth.

E. Ardron (7421)

Parasites of the Peacock butterfly — During late May 1982 I collected up eighty larvae of the Peacock butterfly, *Inachis io* L., from nettles on the waste land adjoining my garden. They were in their last instar and nearly full-fed. Of these larvae I obtained forty pupae and forty pupae of an ichneumon wasp. The latter were slightly elongated spheres, brownish-black with a central cincture of dirty white and attached to the nettles by silken threads. I sent them to Dr Mark Shaw at Edinburgh and I give his comments 'The cocoons ex *N. io* are of a Campoplegine ichneumonid in the genus *Phobocampe* of the species I call *confusa* Thomson, but the name is not very widely used (in fact it isn't on the 1978 Kloet & Hinck's list, although it has been used in the British literature by Stelfox as well as by me). It is a very abundant parasite of *io* and also *A. urticae*, and, as it attacks the second instar of the host, i.e. before they disperse, very often a large proportion of a particular brood are stung'. Members are reminded that parasites, with the remnants of the host, and any data are of importance and Dr Shaw is always most helpful in his comments on material sent to him. Do not forget a stamped addressed envelope with any enquiries.

P. W. Cribb (2270)

TO A FLY

Busy, curious, thirsty fly,
Drink with me, and drink as I;
Freely welcome to my cup,
Couldst thou sip, and sip it up.
Make the most of life you may,
Life is short, and wears away.
Both alike are mine and thine,
Hastening quick to their decline:
Thine's a summer, mine no more,
Though repeated to threescore;
Threescore summers, when they're gone,
Will appear as short as one.

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